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Photo: S. B. Bolas & Co.

ST. MARY, ECCLESTON: INTERIOR, LOOKING EAST.
THE LATE G. F. BODLEY, R.A., D.C.L., ARCHITECT.

On Spires and Towers.

A previously unpublished Letter of A. Welby Pugin, communicated by Dom H. Philibert Feasey, O.S.B., F.R. Hist. Soc.

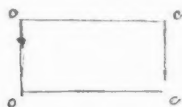


EVEREND SIR,—Allow me to thank you for your kind attention to my communication, which I would have acknowledged sooner had I not been anxious to collect much interesting matter on the subject to lay before you.

From an extract from the Oxford paper founded by my friend the Rev. Mr. Bloxam, and also by a letter from Mr. Parker, the Secretary, I perceive that the original report of your remarks was most incorrect. I can assure you, however, that I did not think of edifying you from any *personal* feelings whatever, but purely from the anxiety I feel that the Oxford Society should set forth the true principles of ecclesiastical architecture.

Since I first wrote, I have travelled by gigs through a great part of Leicestershire and Northamptonshire, to re-examine the churches in those centres, and every instance I have met with bears out my assertion. With this I send a regular statement respecting spires and towers which will, I trust, prove interesting to the Society. I must beg, in the first place, to draw your attention to the *use* and *intention* of spires. They may be considered under two heads, *Natural* and *Symbolical*. The natural use of a spire is a covering or roof to the tower (necessary for the suspension of bells); the symbolical to make that roof an emblem of the Resurrection,¹ and to elevate the great symbol of our redemption.

With regard to a spire considered as a roof or covering, let us take a parallelogram *oooo*—



The most obvious mode of roofing it would be to

¹ The vertical line illustrative of the great mystery of the resurrection is the very foundation of Christian architecture. Everything tends upwards and runs into pyramids and points. Arches, roofs, vaulting, pinnacles, turrets, and last, but not least, towers. When the vertical principle was lost, Christian architecture soon declined, and *four-centred arches, flat roofs, and square-topped towers* came in.

establish two king posts at *ww*, which when viewed in elevation would form a roof of this shape:—



Instead of a parallelogram, let us now take a square— We only want one king post at *s*, and



when viewed in elevation the roof would form— which is, in fact, a low spire.



The Norman spires were in many cases not more elevated than a roof of this shape, and were little more than coverings of a vertical form; but I am not acquainted with a single instance of a Norman tower with an *original flat* roof. Those churches, St. Michel de Vaucelles, St. Loup, Bayeux, have stone roofs. The last two are of very high proportions, but the general method of covering towers in those early times was by timber spiral roofs covered with lead. A very curious plan of Canterbury Cathedral in Hasted's "Kent" (the original of which was made by Eadwin, a monk, about 1130) shows all the turrets and towers terminated by low spires, one of which on the north side is yet standing— All the ecclesiastical buildings represented in the Bayeux tapestry have *low spires*. On early seals the same is universally found. There cannot exist a doubt as to the use of depressed spires on all towers and turrets of the *ecclesiastical buildings* of the Saxon and Norman times,² but with the introduction of the pointed arch and increased height these spires shot up to a prodigious elevation, being indefinitely constructed of stone or timber covered with lead. I have subjoined a list to show that the towers were invariably terminated in this manner until the decline of the pointed style, when embattled towers with angle-pinnacles were introduced,



² The spiral top forms a great distinction between the towers of ecclesiastical and military buildings. The latter are always flat for the purpose of defence. Hence, on the Welsh borders and in Cumberland, on the Scottish border, the church towers are flat, being used for castles, having rooms and *fireplaces* in them, the only access being through a small door from the interior of the churches, which could be strongly secured from the *interior of the tower*.

On Spires and Towers.

and with the exception of the latter feature partook more of the castellated than the ecclesiastical character. For *battlements*, strictly speaking, are of a military character. The churches built during the fine (*sic*) time had open or closed *Parapets* on merely dripping eaves. But the battlement churches are late, and are an additional proof of the multiplication of detail in the Perpendicular style. It is a curious fact that we have no instance of a very late spire, and I certainly have never seen an instance of an early *flat-topped* tower. The absence of squinches in the angles of the masonry does not by any means disprove the original termination by a spire, for they were frequently, very frequently, constructed of timber, which would not require the support of angle arches. I cannot conceive how an architect of the Early or Decorated period could have designed a tower to be

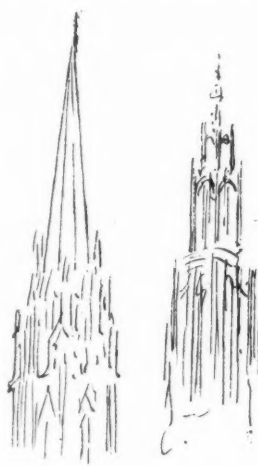


terminated without a spire. Where could he place the cross? And in those times of mystical architecture, the cross as surmounting the whole church would never have been omitted. Indeed, after the general loss of spires, we find even on late towers in many places a very miserable substitute for them in the shape of a sort of central

pinnacle, merely for the purpose of raising a cross.

On the Continent, spires appear to have degenerated into steeples. Strasburg, Antwerp, and Mechlin (as designed) are of this description, and although captivating at first sight by their immense elevation and intricacy of detail are by no means so satisfactory as regular spires. The

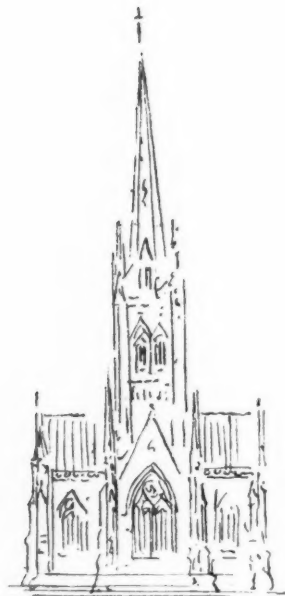
consistency of their purpose as *coverings* to the towers being lost sight of, they become mere fanciful emotions, and cannot be defended on principle. Strasburg itself is far more extraordinary and difficult than beautiful. Nearly two hundred years elapsed between the commencement of the tower and the termination of the steeple, and there is no doubt that had the original design of Evoir de Steinbach



been carried out it would have been very superior

I beg that you will not think it necessary
to reply to the committee at my length I have
added to apologise for writing on your valuable
time by addressing you on the first instance
but the subject is one of so much
importance that I trust it will
be - sufficient apology for the liberty

I remain with Respect
your obedient servant
+ Andy Payne



fin Quid



ideal Quid

THE FINISH OF THE LETTER.

to the present erection. St. Nicholas Newcastle-on-Tyne, the old Bow steeple, Cheapside, and the high church of Edinburgh are instances of this substitution of fanciful design for the antient spire, and all these, I need hardly remark, are of the fifteenth century.



I now beg to refer you to the accompanying list in support of what I have advanced, and in conclusion I am most anxious to draw your attention to an important point, viz., that in the present revival of antient ecclesiastical architecture, *such styles only should be reproduced and followed* as belong to the zenith of Xtian design. Why go back to the Normans, who were only Christian builders with debased Roman ideas, or descend to the Tudors, who were rapidly verging into extravagance, and who had already lost the soul of Christian design?

I have fully made up my mind never again to build a church with four centred arches and

flattened roof. Between the early Lancet and the rich Decorated of Edward III. we have the first models, pure, mystical, and beautiful in design with *exquisite execution*, sculpture unsurpassed in classic antiquity—I may say, unequalled, and believe me, equilateral arches, high roofs, and tapering spires, all belonging to this fine period; while flat roofs, flat arches, and square-top towers must be classed with the debased style of the latter time.

I beg that you will not think it necessary to reply to this communication at any length. I have indeed to apologise for intruding on your valuable time by addressing you in the first instance, but the subject is one of so much importance that I trust it will form a sufficient apology for the liberty.

I remain, with respect,

Your obedient servant,

A. WELBY PUGIN.

✠ Feast of St. Aldhelm, 1843.

NOTICES OF SPIRES AND TOWERS IN ENGLAND.

EDITORIAL NOTE.—The distinguished Architect commenced this list of churches, accompanying his letter, in tabular form; but the arrangement is not maintained throughout, and in places the information is run together in paragraphs. For convenience and clearness the tabular form has been adhered to in this transcription from the original MS., without, however, omitting anything.

SALISBURY:

The Cathedral	.. ..	A centre spire of stone	.. ..	Decorated.
Ditto	.. ..	The bell-tower on the north side had a spire of timber covered with lead, nearly 200 ft. high, demolished in the time of Wyatt.	.. ..	Early English.
St. Thomas's Parish Church	.. ..	An embattled tower	.. ..	Late Perpendicular.
St. Edmund's ditto	.. ..	A ditto	.. ..	Rebuilt in seventeenth century.
St. Martin's ditto	.. ..	A spire	.. ..	Late Decorated.

BATH:

The Abbey	.. ..	A tower	.. ..	Late Perpendicular.
St. James's and St. Michael's	Towers	Both Late.

BIRMINGHAM:

The Parish Church	A spire	Late Decorated.
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BRIDGNORTH:

The Parish Church	A tower	Late Perpendicular.
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BRISTOL:

St. Mary Redcliffe	A spire	Decorated.
St. Edwin's	Ditto	Fourteenth century.
St. Nicholas's	.. ..	Ditto	.. ..	Ditto.
St. John's	.. ..	Ditto	.. ..	Ditto.
Cathedral	.. ..	Tower	.. ..	Fifteenth century.
St. Thomas's Church	.. ..	Ditto	.. ..	Perpendicular.
Temple Church	.. ..	Ditto	.. ..	Ditto.
St. Stephen's Church ^a	.. ..	Ditto	.. ..	Ditto.

CANTERBURY:

South-west tower	.. ..	Embattled	.. ..	Late Perpendicular.
North-west tower	.. ..	Now rebuilt, but formerly had a spire.	See Hol- lar's view.	Norman.
Centre tower	.. ..	.. ..	.. ..	Perpendicular.

^a With this may be classed the towers of Taunton, Glastonbury Parish Church, and several churches of Somersetshire which are of the same style and date—all *Later*.

YORK:

Western and central towers..	..	..	..	..	..	..	..	..	..	All Perpendicular.
Chapter House	..	..	Has a roof almost like a spire in height	..	..	..	..	..	..	Decorated.

LINCOLN ..

The towers were formerly surmounted by three spires of timber covered with lead—the centre one destroyed by a hurricane in the sixteenth century. The two western ones demolished in the present century. The chapter house has a roof like that of York.

BEVERLEY:

Towers at western end	..	..	..	..	..	..	..	..	Perpendicular.
The Parish Church	An embattled tower	Late Perpendicular.

COVENTRY:

St. Michael's and Trinity Churches.	Both spires	Late Decorated.
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DERBY:

All Saints'	A tower	Perpendicular.
St. Peter's, St. Werburgh's and St. Alkmund's.	All towers	Very Late.

RIPON :

Minster	West-end: two high leaded spires on Early English towers; centre tower: high timber spire leaded. All demolished.	—
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HOWDEN (Lincolnshire)

A tower Early Perpendicular.

HEDON

Ditto Early Perpendicular.

PALTINGTON

A spire of Early Perpendicular Late Decorated.

LEICESTER (Town):

St. Mary's, St. Martin's, St. Nicholas's.	All spires	..	..	..	..	..	..
St. Margaret's	A tower embattled	..	..	..	..	..	<i>Late.</i>

LYNN REGIS⁵:

St. Margaret's	Has two western towers	One Late; the other Decorated.
	The Late one was <i>originally embattled with pinnacles</i> . The Decorated had a very lofty spire of timber, which for uniformity was demolished during the last century, and the Decorated tower embattled like the Late one.	
St. Nicholas Chapel . .	A high timber spire was demolished	Late Decorated.

NORTHAMPTON:

St. Sepulchre's	..	..	A fine spire	..	..	..	..	Late Decorated.
St. Giles's	..	..	Tower embattled	..	..	..	..	Late.
St. Peter's	..	..	Tower embattled in the sixteenth century	..	..	..	..	—

NORWICH:

Parochial Church Towers .. .. .	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .
Cathedral .. .. .	.. .. .	A spire about 1370	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	All Late.

PETERBOROUGH:

Early English tower	Timber spire demolished	—
On small towers, west end ..	Two stone spires	Late Decorated.

EXETER

ETER	The embattling and upper story of towers	Very Late Perpendicular.
The towers of parochial churches.	.. .. .	Late.

GLOUCESTER:

Centre tower	A tower with pinnacles	.. .. .	Perpendicular.
Church of St. Mary Le Crypt	A tower with pinnacles	.. .. .	Perpendicular.
St. Nicholas	A spire .. .. .	.. .. .	Late Decorated.

SOUTHWELL:

Minster.. .. Two high timber spires on Norman towers, now demolished.

HEREFORD:

On centre tower	..	..	A high timber spire now demolished	..	..
The Parish Churches of St. Peter's and All Saints.			Both high spires	..	..
St. Nicholas	..	..	An embattled tower	..	..
			
					Late.

⁴ Query Patrington, Hull (Ed.).

⁵ King's Lynn (Ed.).

LICHFIELD:

Cathedral	Three spires of stone	Decorated.
St. Chad's Parish Church ..	A stone spire	Late Decorated.

IPSWICH

All towers and All *Late*.

KINGSTON-UPON-HULL ..

A tower Early Perpendicular.

NOTTINGHAM:

St. Mary's	A tower	Very Late Perpendicular.
St. Peter's	A spire	Late Decorated.

OXFORD:

Merton	A tower	Perpendicular.
St. Mary Magdalene	Ditto	Late Perpendicular.
New College	Ditto	Early Perpendicular.
St. Mary	A spire	Decorated.
Christ Church	Ditto	Early English.
Old All Saints'	Ditto	Late Decorated.

The upper part of towers of most of the parochial churches at Oxford were altered in the early part of sixteenth century.

LINCOLNSHIRE:

Grantham	A spire	Decorated.
Brant Broughton	Ditto	Ditto.
Leadenham	Ditto	Ditto.
Fulbeck	A tower	Perpendicular.
Claythorpe	A spire	Decorated.
Sleaford	Ditto	Early English
Heckington	Ditto	Decorated.
Ewerbey	Ditto	Ditto.
Tattershall	A tower	Late Perpendicular.
Donington	A spire	Decorated.
Swineshead	Ditto	Ditto.
Wigtoft	Ditto	Early.
Frampton	Ditto	Early English.
Sutterton	Ditto	Late Decorated.
Gosberton	Ditto	Ditto.
Spalding	Ditto	Decorated.
Moulton	Ditto	Ditto.
Surfleet	Ditto	Ditto.
Quadring	Ditto	Ditto.
Sutton, St. Mary's	A high timber spire covered with lead ..	Early Lancet.
Morton	Ditto	Perpendicular.
Haconby	A spire	Decorated.
Dunsby	A tower embattled	Late.
Rippingale	Ditto	Ditto.
Dowsby	Ditto	Ditto.
Billingborough	A spire	Decorated.
Horbling	An embattled tower	Late Perpendicular.
Helpingham	A spire	Decorated.
Wiberton ⁶	An embattled tower	Perpendicular.

These instances ought to prove that spires do not belong to countries, but to periods and styles. Every Early and Decorated tower in Lincolnshire has a spire, while these are interspersed with embattled towers, all Late. The only reason why some counties are more famous for spires than others is simply because we find more churches of a particular date in these counties. In many, the spires were mostly of wood covered with *wooden shingles*, some of which yet remains, but most have disappeared, owing to the perishable material. In Kent, they are covered mostly with Rag stone, hence the spires were mostly of wood covered with lead. Many were taken down when the towers were repaired in the fifteenth and sixteenth centuries,⁷ and more until the last century. Rochester Cathedral had a spire of timber covered with lead. In my recollection Minster spire in the Isle of Thanet is yet remaining. St. Clement's, Sandwich, was the same.

Barrowby	With a high spire	Decorated.
Stamford: St. Mary's ..	A spire	Ditto.
All Saints'	A spire	Early Perpendicular.
St. Martin's	{ Late towers.	
St. John's		
Louth	Is terminated with a high spire	Very Early Perpendicular.

LEICESTERSHIRE:

In Leicestershire the fact of spires depending on styles and not locality is equally remarkable.

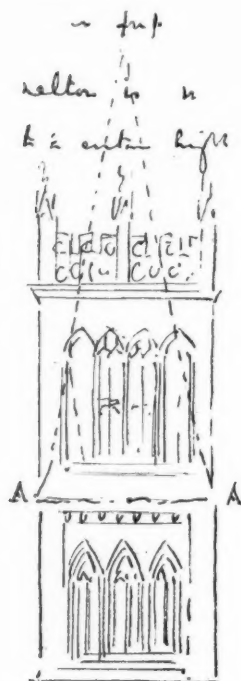
Kegworth	A spire	Late Decorated.
Loughborough	A tower embattled	Perpendicular.
Sileby	Ditto	Ditto.
Syston	Ditto	Ditto.
(And all, I believe, by the same architect.)		
Queniborough	A spire	Early Decorated.
Gaddesby	Ditto	Ditto.
Ashby Folville	A tower	Perpendicular.
Kirkby	A spire	Decorated.
Asfordby	Ditto	Ditto.

⁶ Now usually spelt Wyberton (Ed.).

⁷ Most of the towers of the Kentish churches were rebuilt or the upper part reconstructed about this period. We not infrequently find Late towers with ancient naves.

LEICESTERSHIRE—continued.

Melton



Is most interesting in this respect. The tower is Early English up to a certain height to A.A. Here is actually a block projecting string which was originally under the spire. The upper part of the tower was added in the fifteenth century. Now in this case either the spire was never completed, or taken down at that period, and the tower raised.

Nether Broughton and Over Broughton. Have both towers of Late Perpendicular work.

A little further on we have—

Bingham An Early English tower with a spire
 Bottesford With a high spire Decorated

EDITORIAL NOTE.—Here Pugin returns to churches immediately over the border in Lincolnshire, and these are entered under that county.

This catalogue of English examples is ended by a general note (immediately following), after which Pugin proceeds to tabulate "Some Spires in Normandy."

It is, of course, unprofitable to notice in this account a hundredth part of the examples that may be cited in support of my position; but it is impossible to examine the towers now existing with strict attention without perceiving that embattled towers were substituted for spires in the Late Perpendicular churches, while every complete tower of the earlier date is terminated by a spire. The spire went down with the roof, and flat roofs and embattled towers are invariably found together. Counties which are celebrated for spires are full of Early and Decorated Churches of stone construction; while in those counties where few spires are found, the towers are either Late or have been altered at a Late period. The finest churches of Norfolk are mostly Perpendicular, those in Suffolk the same: huge towers with flint and panel work, fine of the style, but not comparable to the earlier designs. Often the lower part of a tower, as at Huntingdon,⁸ is Decorated, and the upper part re-built in the fifteenth or early sixteenth century with a square embattled top. In conclusion, if any tower can be pointed out to me (which I have not seen) as complete of the Decorated or Early period without a spire, I will at the earliest opportunity proceed to examine the same and make a report upon it.

SOME SPIRES IN NORMANDY.

JUMIÈGES:

Abbaye de Jumièges Two at the western end (timber) Very Early.
 Ditto One on the entrance of St. Peter's Church (timber) Thirteenth century.

ABBAYE DE ST. WAN-
DRILLE.

One on the centre tower of immense height (stone) Thirteenth century.

LILLEBONNE:

Parish Church One of stone Early part of thirteenth century.

⁸ EDITORIAL NOTE.—This word in the original schedule looks like Hintinydon; but such a place does not appear to exist. Pugin probably refers to St. Mary's at Huntingdon, which was re-constructed in the reign of Henry VIII.

HARFLEUR:							
Parish Church	..	..	One of stone	..	..	..	Early part of fifteenth century.
GRANVILLE:							
Parish Church	..	..	One centre tower (timber)	..	..	..	Very Early.
MONTIVILLIERS:							
Abbaye de Montivilliers	..	..	West end (stone)	..	..	..	Twelfth century.
Ditto	..	..	One centre tower (timber)	..	..	..	Ditto.
BOSCHERVILLE:							
Abbaye de St. Georges	..	..	Two west end (stone)	..	..	..	Early part of thirteenth century.
Ditto	..	..	One on centre tower (timber)	..	..	..	Very Early.
ROUEN:							
Cathedral	..	..	1. Spire over the centre tower (stone)	..	..	..	Eleventh century.
			2. Spire over the centre timber (burnt)	..	..	..	Thirteenth century.
			3. A steeple over the centre timber (burnt)	..	..	..	Sixteenth century.
			The two western towers are very Late, and are without spires.				
St. Maclou	..	..	On centre tower, stone; destroyed by a storm	..	..	..	Fifteenth century.
EVREUX:							
Cathedral	..	..	On centre tower (timber)	..	..	..	—
BAYEUX	..	..	West end, two spires (stone)	..	..	..	Twelfth century.
COUTANCES	..	..	West end, two spires (stone)	..	..	..	Ditto.
CAEN:							
Abbaye of St. Étienne (l'Abbaye-aux-Hommes)	..	..	Two at west end, stone	..	..	..	Twelfth century.
St. Pierre Parish Church	..	..	One at west end, stone	..	..	..	Fourteenth century.
St. Sauveur Parish Church	..	..	One at west end, stone	..	..	..	Fourteenth century.
St. Étienne Parish Church	..	..	One at west end, timber	..	..	..	Fourteenth century.
St. Jean	..	..	Constructed for spire but not built, owing to a settlement.				Thirteenth century.

SOME REMARKABLE SPIRES IN FRANCE AND THE CONTINENT.

CHARTRES	..	..	At west end, one very fine, in stone	..	..	..	Twelfth century.
Ditto	..	..	One at west end; open, and not so good, in stone	..	..	..	Fifteenth century.
ABBAYE, ST. DENIS	..	..	Two at west end in stone	..	..	..	Twelfth century.
PARIS:							
Abbaye St. Germain	..	..	Three; two at west end, one in centre, timber.	..	..	..	Twelfth century.
			The centre and one west end now demolished.				
Sainte Chapelle	..	..	A high spire of timber	..	..	..	Thirteenth century.
ABBEY OF ST. VICTOR	..	..	A stone spire at west end	..	..	..	Twelfth century.
Ditto	..	..	One in centre of timber	..	..	..	Fourteenth century.
BEAUVAIS: Cathedral	..	..	A stone spire in centre	..	..	..	Fourteenth century.
COLOGNE	..	..	Two high spires were designed for the Cathedral	..	..	..	—
FISBURGH AND BRIEUX	..	..	A high spire at west end	..	..	..	—
GELNHAUSEN	..	..	Three spires	..	..	..	—
MARBURG:							
St. Elizabeth	..	..	Two stone spires at west end, a timber one in centre	..	..	..	—
LIMBURG	..	..	A high spire in centre	..	..	..	—
NUREMBERG:							
St. Laurence	..	..	Two spires west end	..	..	..	—
BRUGES:							
Notre Dame	..	..	A high spire on one side	..	..	..	—

I believe fully that the spire entered equally into the designs of foreign château architects during the Early and Decorated period as it did into those of England. Nay, more, I do not remember to have (seen?) a tower that was finished with a square top. The Late ones on the continent were finished with open lanterns and archwork, more like Boston, so that the spiral outline was in some measure preserved.

Books.

A DIM PERCEPTION OF THE OBVIOUS.

The Principles of Architectural Design; by Percy L. Marks, Architect. 10 in. by 6 in. pp. xx, 266. 165 full-page illustrations and others in text. 10s. 6d. nett. London: Swan, Sonnenschein & Co., Ltd., 25, High Street, Bloomsbury.



ADMIRERS of Mr. Hilaire Belloc will remember that the hero of "Lambkin's Remains" was the author of "Shots at the Probable" and "Little Journeys in the Obvious." Mr. Marks is a past master of the Lambkin literary method. When he is accurate he merely says the obvious; but he is not always accurate. The idea in his mind seems to have been to do something for the architectural public on the lines of Mr. Belcher's "Essentials of Architecture." Mr. Belcher, as most of our readers by this time know, has written a delightful and helpful book illustrated with appropriate architectural examples. Mr. Marks has produced a volume banal and dreary to the last degree; the illustrations are not merely bad, they are simply execrable. He has, moreover, amongst his sketches given what purport to be details by various architects of note. There is a doorway by Mr. Lutyens, a door by Mr. Harold Cooper, and other details, the drawings of which would, we suspect, greatly astonish their authors. We tender to them our respectful sympathy. The book opens with a dedication in which Mr. Marks reveals to us the emotional side of his nature. Tributes to domestic happiness are good things in their place, but unsuitable, we think, for the public eye. Before Mr. Marks proceeds with the enunciation of what he conceives to be the various principles governing architectural design he provides us with an introduction. Of this we need reproduce no more than the rhetorical question, "Who shall say with confidence what is or is not correct Taste, pure Taste? *Quot homines, tot sententiae.*" Fortunately, there is only one Mr. Percy L. Marks.

We do not propose to weary our readers, as we have ourselves been wearied, by taking them through the chapters of this book; but on the quality of mystery in architecture, and on the symbolism which is used in connection with it, it would be cruel to withhold the luminous information which our author affords. There are two large tables, extending over many pages:

- a. Symbols and their significance.
- b. Subjects and their symbols.

A plate of line sketches is added for their elucidation. From these lists we take the following extracts:—

1. Ark, Noah's Safety.
2. Balls, three golden . . Pawnbroker.
3. Britannia England.
4. Ram, suspended . . . Tailor's sign.

On turning to the plate for illumination on these transcendental matters we find a picture of an ark with the legend thereon "Security" and beneath it the further legend, "Messrs. Bryant & May's trade mark for safety matches." The Lombardic symbol is also drawn for our enlightenment, and underneath the legend, "Mr. Attenborough, Pawnbroker, City Road, London." The graceful lineaments of Britannia meet our gaze from a sketch of a halfpenny. Surely mysticism can go no further. We were under the impression that the suspended ram was the device of the Order of the *Toison d'Or*, but the mystical Mr. Marks can find nothing in it but a tailor's sign.

When we get to practical questions we find that vitrified material has a beneficial influence on colours, and that a greater play of reflected and refracted light is obtained. If Mr. Marks will consult some shilling primer on optics he will find that opaque vitrified material is not in the habit of refracting light, and when he next bursts into print he will be able to share with us the results of his optical researches. On really architectural matters his guidance is equally illuminating. "Square shafts or piers are but a clumsy expedient in building. If used, means should be employed to take away from their too ponderous appearance by the use of *pier-mirrors.*" When we design our houses, "for inner and garden lobbies such sentiments as '*Pax vobiscum,*' '*Salve,*' '*Wilcome,*' would be appropriate, and a pictorial representation of the domestic cat might be made effective." We thank Mr. Marks for this priceless suggestion.

The late William Jerdan, when asked how he found time to review books, replied, "Oh, I put the paper knife into them and smell it." We have adopted the more drastic and painful course of reading the book, and, indeed, Jerdan's method was unnecessary, for the leaves are already cut. It is the only praise we can bestow on this preposterous volume.

COLOUR BOOKS OF SUNNY LANDS.

Cairo, Jerusalem, and Damascus: Three chief cities of the Egyptian Sultans. By D. S. Margoliouth, Litt.D., with illustrations in colour by W. S. S. Tyrwhitt, R.B.A., and additional plates by Reginald Barratt, A.R.W.S. 9½ in. by 6½ in. 58 colour plates, 4 line drawings. pp. xvi, 301. 20s. nett.

Lisbon and Cintra. With some account of other Cities and Historical Sites in Portugal. By A. C. Inchbold. Illustrated with 30 colour plates by Stanley Inchbold. 9½ in. by 6½ in. pp. xii, 248. 10s. 6d. nett.

London: Chatto & Windus, 111 St. Martin's Lane, W.C.



WHEN the colour book came first into fashion, the colour plates were thought to be interest enough, and little attention was paid to the letterpress, with the result that this sort of publication is taken not very seriously by some people.

Messrs. Chatto & Windus claim for their series that they are serious books by serious authors, and that the text equally with the illustrations constitutes their value. It is rare that a topographical book owes its provenance to so learned a writer as Professor D. S. Margoliouth, and as Mrs. Margoliouth, who contributes the parts relating to architecture, is a serious student of buildings, there are all the elements of a delightful and informing book. The history of Cairo is a welter of bloodshed and contention. Fatimide, Ayyubid, Mamluke, and Turk followed each other in the game of murder till the days of the Khedives and the present period of peace and prosperity. The dark and mediæval ages have been well described as "a kind of bloody Henley, where you cannot see the river for the boats." Presumably the common people had some definite life in which their human relations developed, but we see it now with difficulty, and in Cairo at least it is almost invisible. Take the case of the Mamluke Sultan Nasir. His reign was in three parts, with intervals of deposition, and his eight sons all had a turn at the throne with varying results of abdication and assassination. The Mamluke system by which slaves were made kings tended to make murder normal and poisoning an exact science, while the uncertainty of sovereignty produced a tendency in the rulers to profligacy, "for to-morrow we die."

Of the architectural criticism it may be said that some of its value is lost by the absence of plans. The colour plates deal delightfully with exteriors and interiors, as may be seen from the two we reproduce by kind permission of the publishers. Mr. Tyrwhitt has happily caught the heavy brilliance of Cairo and the softer tones of

the Dome of the Rock. Some of these Eastern buildings are curiously like mediæval European work, except for small differences. On the walls of Damascus are houses that, save for the absence of windows in the lower part, might be on the banks of a Dutch canal. Islam made a deep mark on Christian Spain, but the Crusaders *en revanche* left more than their bones in the East. The Sulaiman Mosque at Damascus deserves mention if only because of a description which says that its architect was "the most incomparable of great geniuses, the noblest of the children of Persia, our Master Mulla Agha." We fear architects in colder climes do not always thus get their deserts. The book is altogether a useful aid to the study of Arab history and art.

Of Mr. and Mrs. Inchbold's book on Lisbon and Cintra, we fear we can hardly say that it is very serious. Mr. Inchbold's water-colours are pretty, but in his architectural sketches there is some lack of sympathy. From time to time one meets glowing descriptions of buildings, e.g. the old castle of Almourel, and the Convent of Christ at Thomar; but there is no picture of the former, and only a hazy distant view of the latter.

The Manueline architecture of Portugal, with its constant recurrence of the cable motive, is so little known that here was an opportunity to illustrate it adequately.

The authors are kinder to the Moorish Palace of Cintra. Surely there is no other city of such extraordinary beauty, of which the chief features are colossal chimneys—in this case cone-shaped. Mrs. Inchbold's literary style is a little florid; "assentives," "chroniclist," and "sculptury" are words that jar, and we rather despair when we meet "one of the most unique." Also there is no index. We observe that Messrs. Chatto & Windus have in preparation in this series an authoritative work on Assisi. We await it with great interest. Everyone is Franciscan these days, and the home of the saint has poignant memories of the wild days of mediæval history.

THE MODERN PLUMBER.

The Modern Plumber and Sanitary Engineer. By sixteen specialist contributors. Edited by G. Lister Sutcliffe, A.R.I.B.A., M.R.S.I. Divisional Vol. IV. pp. xi, 360, 7 plates, 250 illustrations in text. 10 in. by 7 in. 6s. nett. London: The Gresham Publishing Co., 34 and 35 Southampton Street, Strand.

THIS volume continues admirably on the lines of those already published, and deals with sanitary matters such as baths, tests for sanitary fittings. Other sections cover bells of all sorts, speaking tubes, and telephones. There is a useful house-drainage plan, coloured, contributed by the editor.

Some Modern English Church Work.



THE examples of modern English ecclesiastical work included in this issue represent a gradual accumulation of current work, and possess, therefore, a rather stronger merit than would attach to a collection of views hastily gathered for a pre-determined occasion. The buildings illustrated hold some special interest for their authors, and in some cases give expression to new views or fresh ideals in this important branch of architectural design.

The death of Mr. Bodley, one of the last prominent men of the Gothic Revival, suggests an opportunity to take a rapid survey over our recent achievements in church work. Eccleston Church, suggested by him for illustration, is typical of the refined and scholarly work by which he will be richly remembered. Moreover, in an interesting letter he speaks of the peculiar pleasure derived from this work, in that the opportunity had been given to him "to build a completely finished structure, and to decorate it with oak work, marble, and stained glass." Alas, how few church architects have such opportunities! St. Erkenwald, Southend, by Mr. Tapper, is an example of the manner in which the modern church is too often erected. Confined to the simplest material, and with the structure incomplete, the architect has yet contrived to give to this fragment a dignity which over-elaboration too often destroys. The same qualities of breadth and simplicity are also exemplified in the church of St. Swithin, Hither Green, where, again, much of the decorative work yet remains to be done.

Two conventual churches, the chapel of Holy Cross Home, Haywards Heath, and Downside Abbey near Bath, have a particular note of their own. The new choir of the latter is one of the last works of the late Mr. Garner, who predeceased his erstwhile partner, Mr. Bodley, by about a year. It is characteristic of the chapels of these religious communities that solid and enduring building is a first consideration. The decoration is an after labour of love for the community and its friends. In other respects the plan has been considered rather from the particular requirements of the respective communities.

Two buildings of distinctly original appearance are the churches by Professor Pite and Mr. Harrison Townsend. Christ Church, North Brixton, is the solution of sundry difficulties not unknown to church architects: a building to provide a clear and untrammelled view of the pulpit for a large congregation, a cramped site, and the necessity for economy. The result may be seen in the

views. Professor Pite has given London a new note in suburban church architecture, in consonance with modern religious feeling and thought. Mr. Townsend's country Chapel of Ease is somewhat Italianised by the cypress tree in the foreground, but the building is really a simple concrete structure to which subsequent benefactions have added the richness of alabaster wall-linings in the sanctuary. The top lighting of the east end adds greatly to its effect.

To some extent Perpendicular or Late Perpendicular work seems now to be favoured in the north of England, and Christ Church, Port Sunlight, follows this style; but the treatment could be properly described as a free one. Being the gift of a generous benefactor, the architects have had the advantage of building a complete and finished structure without being hampered by want of means. Ullett Road Chapel has also been favoured by the benefactions of members of the congregation; and the architects have thus erected a more ornate structure than is usually possible, and employed the services of distinguished artists in the decorative work. The whole is a very complete and interesting scheme.

There are other examples, already published in the REVIEW, that one would need to bear in mind in any considered criticism of modern English church work, such as Bentley's Westminster Cathedral, Mr. Godfrey Pinkerton's interesting church at Summerstown, and work by Mr. E. S. Prior. But in so far as a general view will cover such an extended field these examples merely confirm a first impression that modern English church work is distinctly of an eclectic character, and in this respect it is not vastly different from the design of other modern structures. There is considerable satisfaction, however, to be derived from the greater breadth and simplicity that characterises much of our modern church work and furnishes proof of its real vitality. The slavish copyism of mediæval work, the sketch-book architecture of the Gothic Revival, is gradually dying out, and since Westminster Cathedral came upon an astonished architectural world we are more willing to believe that Christian Architecture was not confined to the twelfth and thirteenth centuries. If that fact can be more effectually impressed upon the minds of church-building committees there is hope for our future work in this direction. The fact that Professor Pite has to place his work on record before its mutilation proves the necessity for a more thorough education of such bodies. That under the incubus of a Christian rule in style church architecture has been able to preserve its vitality and even show evidences of future promise is a fact of which English architects may reasonably be proud.

Church of St. Mary, Eccleston, near Chester.

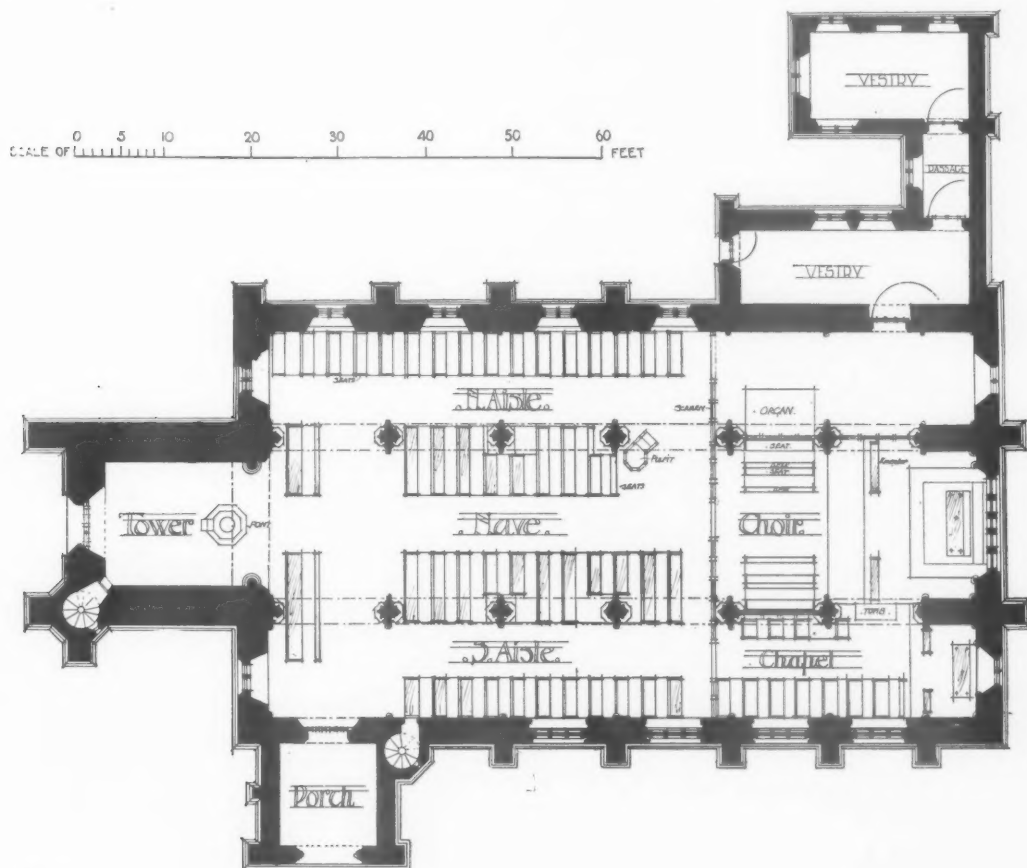
The Late G. F. Bodley, R.A., D.C.L., Architect.



THIS church, built by the late Duke of Westminster, has afforded the architect an opportunity of building a completely finished structure, of furnishing it throughout with oak work, filling every window with stained glass, and laying the floor with marble pavements. It is not often that such an opportunity occurs.

The structure is entirely of new sandstone externally and internally. This gives it a tone free from the raw look that white stone has. The church is continuous, there being no choir arch, and the clearstory windows are continued in the side walls of the western tower. All this gives a unity of idea and an artistic breadth of effect.

The fabric is vaulted throughout with stone, except the vestries, which have oak roofs. The tower is at the west end, and above the tower arch there is an exceedingly well-placed organ richly gilded. The chancel is formed by open oak screens of rich character and well carved. There are convenient vestries. Each window, as has been said, is filled with excellent stained glass. The font is of marble, surmounted by a high oaken cover. There is a high reredos of red stone with many well-carved figures, and a side chapel. On the right-hand side of the altar there is an altar tomb in white alabaster under a carved oak canopy. The tomb has a life-size effigy of the late duke, and at the sides the Westminster coat of arms in colour. The builder was Mr. R. Franklin of Deddington. The glass was carried out by Burlison and Grylls.



PLAN.



Photo: S. B. Bolus & Co.

VIEW FROM SOUTH-EAST.

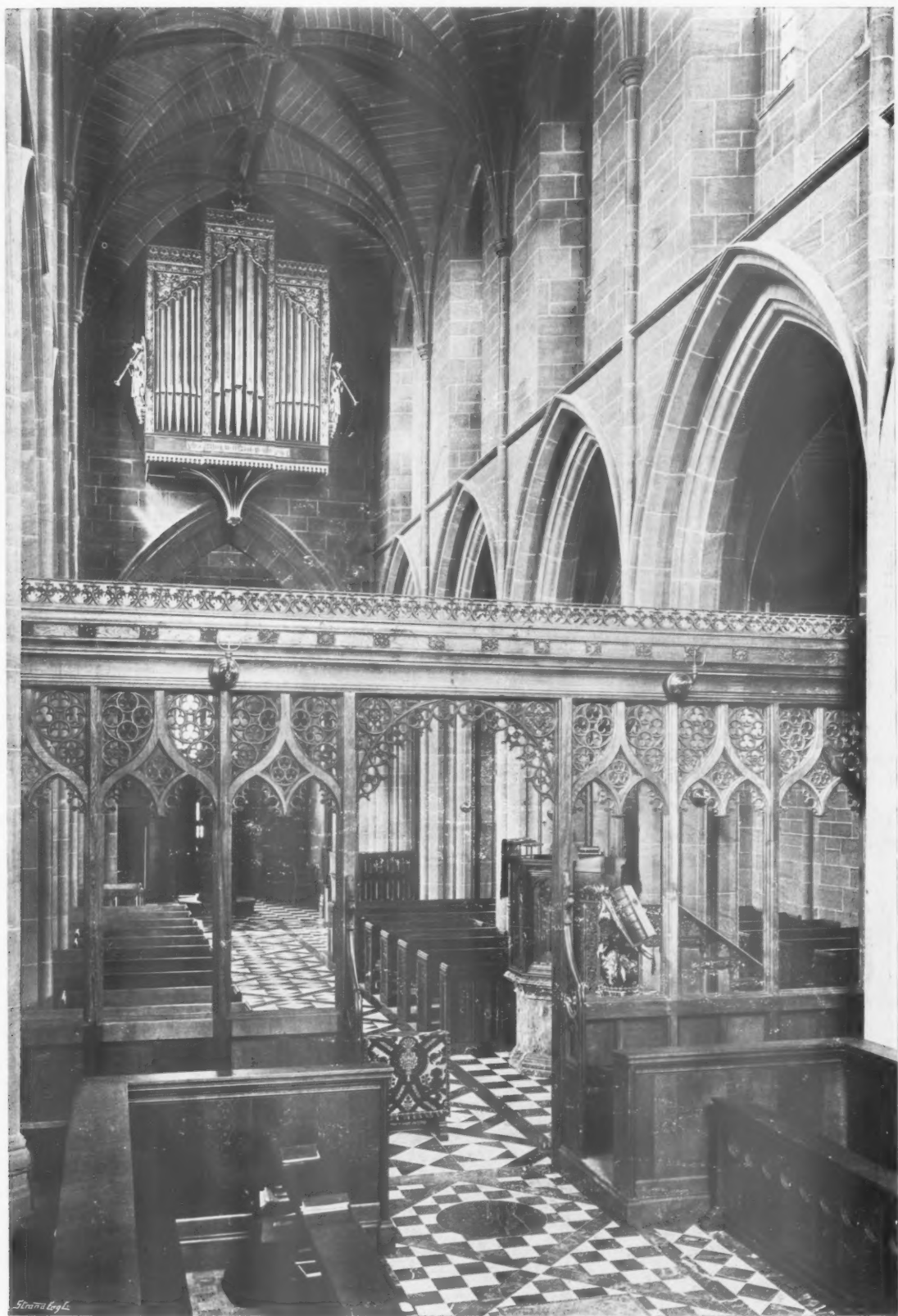


Photo: S. B. Bolas & Co.

THE SCREEN FROM THE SOUTH AISLE.



THE CHOIR FROM THE SOUTH CHOIR AISLE.

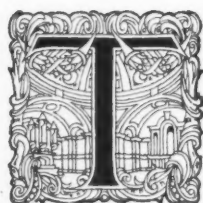


VIEW LOOKING WEST.
VOL. XXIII.—B

Photo : S. B. Bolas & Co

Christ Church, Port Sunlight.

William and Segar Owen, Architects.



THE church stands almost in the centre of the village of Port Sunlight, Cheshire—the Garden Village which Messrs. Lever Brothers, Ltd., have erected for their work-people, close to the Sunlight Soap Works. The edifice is the gift of Mr. W. H. Lever, the founder and head of the large works and the village.

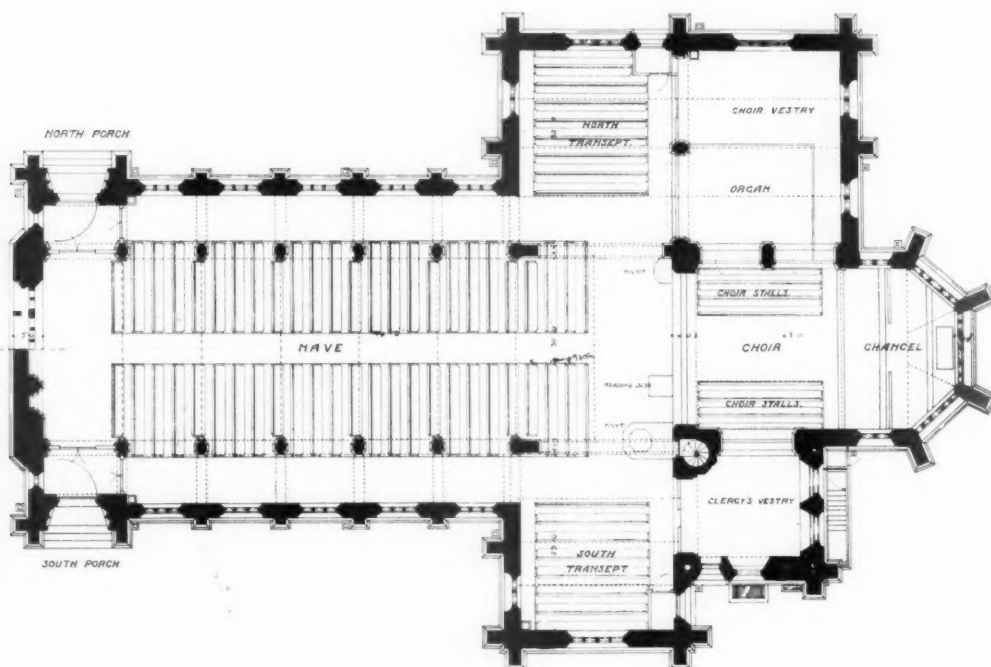
The plan of the building is simple, a wide nave, chancel, transepts, and narrow side aisles. Designed in the Later Perpendicular style, with a certain amount of freedom in regard to details, it is built in local red sandstone from the Helsby Quarries. The roofs throughout are open timber, covered with brown Staffordshire flags. The paving of the aisles is in Sicilian marble. The flooring under the benches is in English oak.

The whole of the building was executed by Lever Brothers' building department; the organ

cases, choir stalls, communion table, reredos, pulpit and reading desk by James Hatch & Sons, Lancaster, the principal wood-carving being executed by C. J. Allen of Lancaster. In the tower is hung a peal of eight bells, the tenor of which weighs 15 cwt. This work was executed by Mears & Stainbank, London. The bells are as follows:—

			Cwt. qr. lb.	In.
Tenor (largest)	..	..	14 3 11	45
Seventh	..	..	10 2 12	40½
Sixth	..	..	9 0 24	37
Fifth	..	..	8 1 15	35½
Fourth	..	..	7 0 16	33
Third	..	..	6 0 9	31
Second	..	..	5 1 20	29
Treble (smallest)	..	..	4 3 19	28
Total	..	..	66 2 14	

The font and stone carving throughout was executed by J. J. Millson, Manchester. The chancel windows are erected to the memory of Mr. and Mrs. Lever, the parents of the donor.

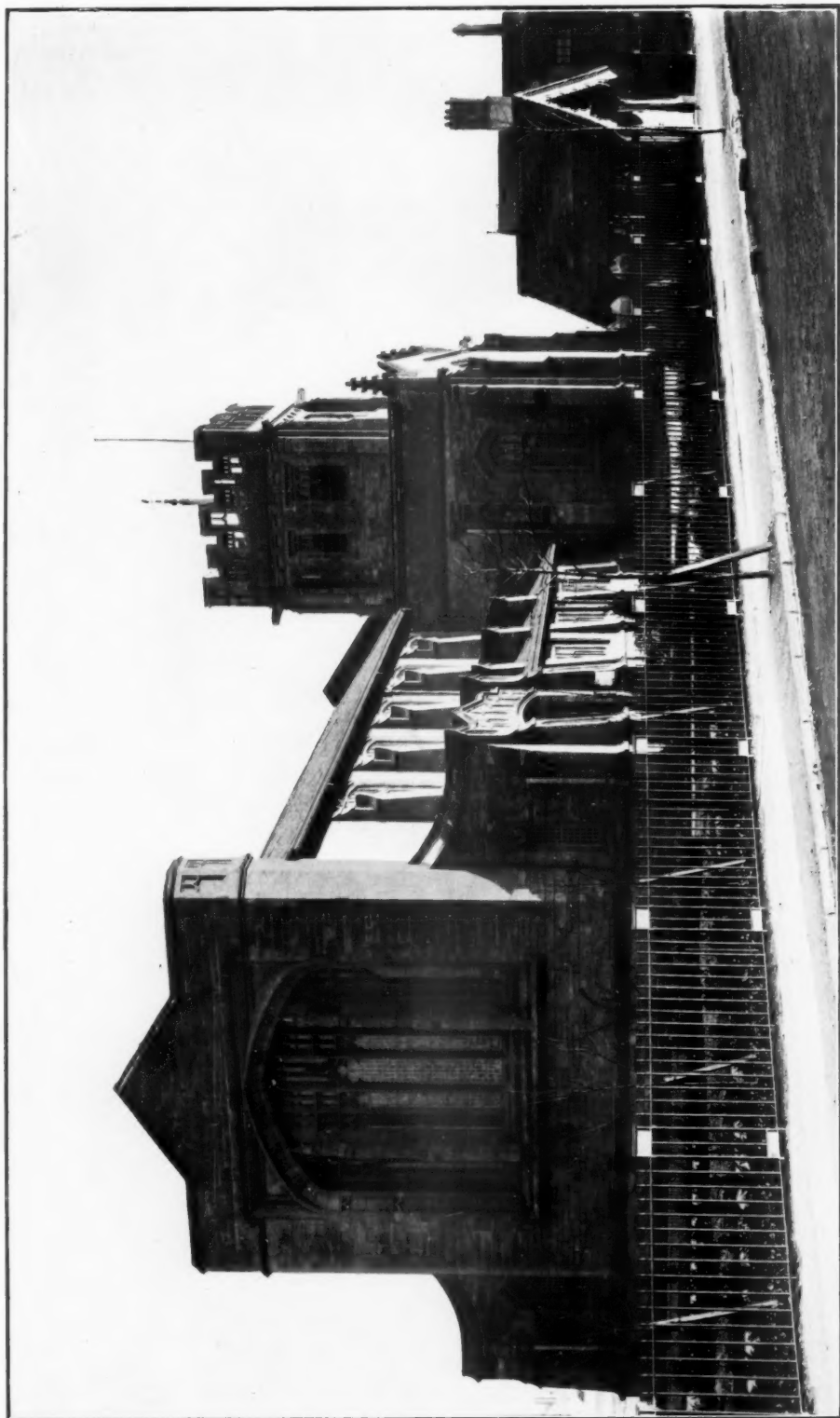


PLAN.



Photo: T. Lewis.

VIEW FROM THE EAST.

*Photo. T. Lewis.*

VIEW FROM THE SOUTH-WEST.

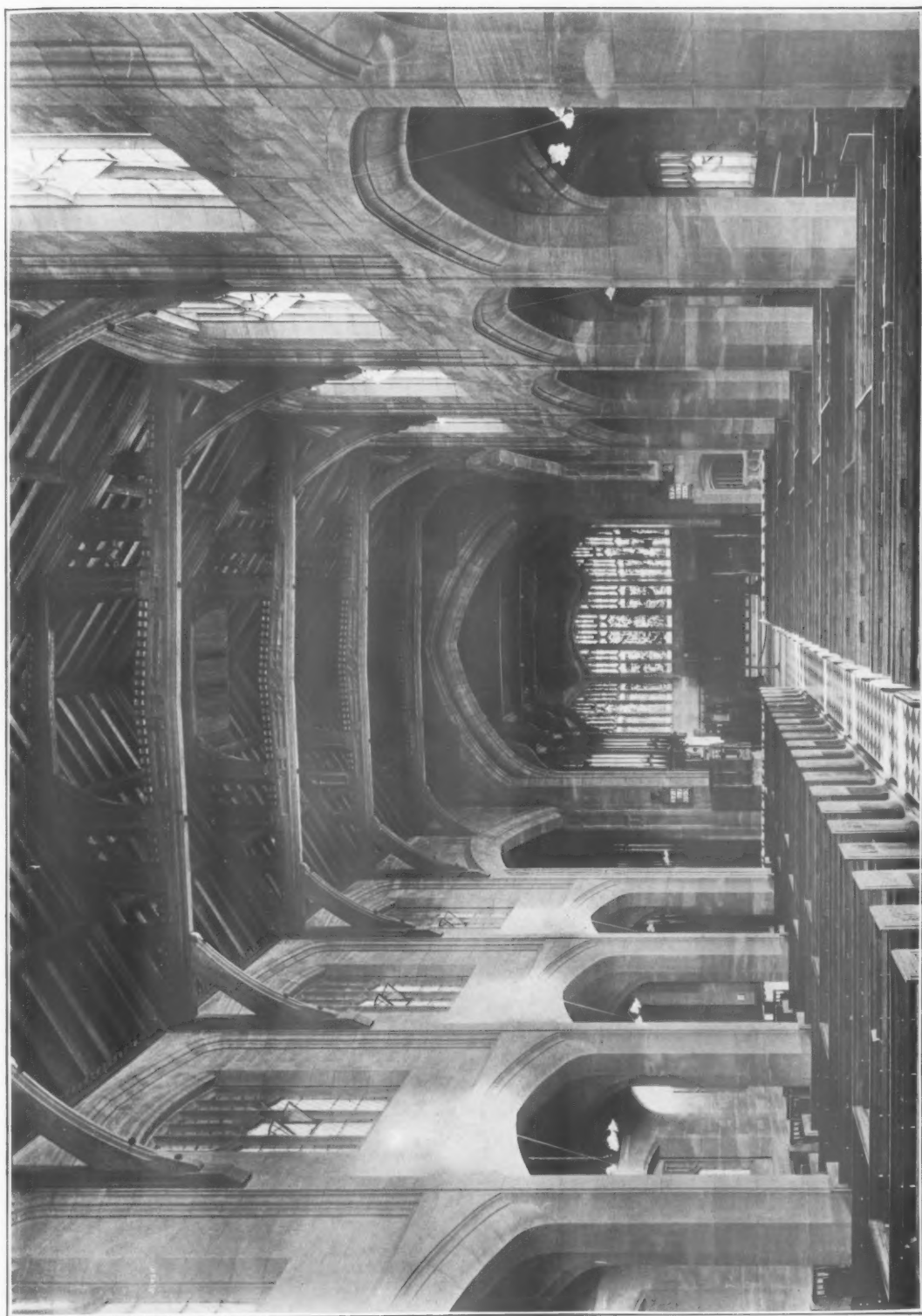


Photo: T. Lewis

THE INTERIOR, LOOKING EAST.

*Photo: T. Lewis.*

THE CHOIR.

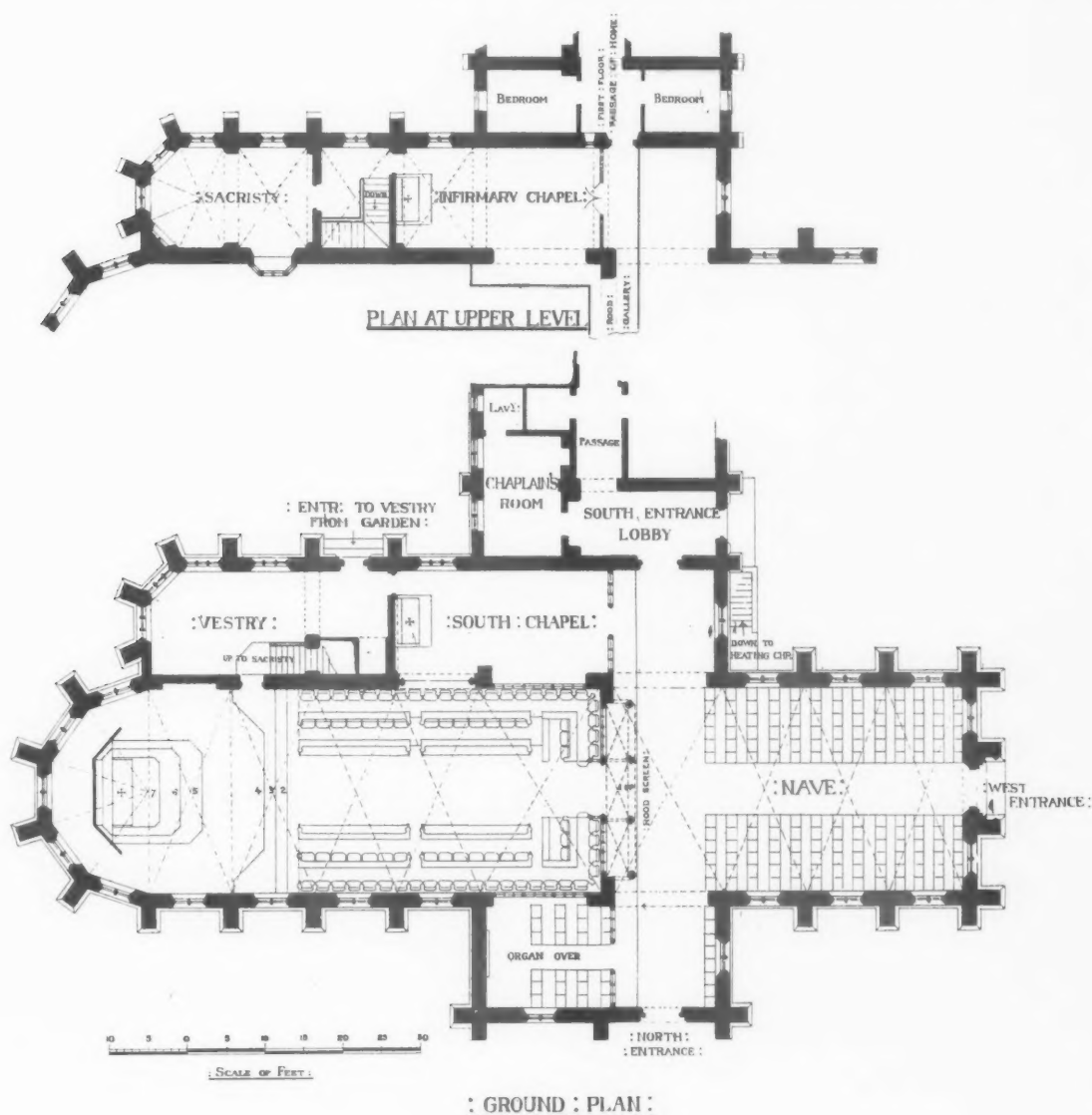
The Chapel, Holy Cross Home, Haywards Heath.

Walter E. Tower, Architect.



THE Chapel for the Community of the Holy Cross at Haywards Heath is built of local red brick, all moulded work being in Bath stone; it is 122 ft. long from apse to west doorway, and 62 ft. high from floor to ridge; the nave is short, having three bays only. The transepts

are divided into two bays, the western bays forming a wide gangway in front of the rood screen and the eastern bays forming small side chapels, that in the southern transept being extended some feet eastward, and having a vestry beyond it. The rood screen is of Bath stone, running from end to end of both transepts and having a wooden gallery, which it is proposed to enrich considerably with further carving and painted and gilded work.





VIEW FROM THE WEST.

Photo: C. Ellis.

This rood gallery was purposely made of ample dimensions to hold a choir of girls from the orphanage in connection with the home; leading off it on the north side is the organ gallery, and on the south side an "upper" side chapel which is

used by infirm sisters who can be wheeled into it from their bedrooms on the first floor of the home. Beyond this chapel again, and over the vestry with which it is connected by a stone staircase, is the sacristy.



THE REREDOS.

Photo: C. Ellis.

Eastwards of the rood screen are divided stalls for eighty sisters and benches for thirty novices. The reredos is entirely of wood, carved and gilt; its extreme height is 28 ft. The vaulting to the nave and transepts is of wood, but eastwards of

the rood screen it is of breeze concrete with stone ribs.

Norman & Burt, of Burgess Hill, Sussex, were the builders employed on the entire work.

*Photo : C. Ellis.*

THE CHOIR AND ROOD.

St. Martin's Church, Wonersh, Surrey.

C. Harrison Townsend, Architect.



THIS is a simple and inexpensive building, intended to serve as a chapel-of-ease for the hamlet of Blackheath, Surrey, on the borders of which place it is situated.

The vestry at the east end is formed from an old cottage to which the porch and projecting windows were added. The length of the church is 63 ft., the breadth 23 ft., and the height from the floor to the highest point of the barrel ceiling is 15 ft. 3 in. The walls are composed of concrete 2 ft. 9 in. in thickness, the outside face being covered with rough plaster, and the window buttress and door stonework are of Ham Hill stone left roughly dressed. The roof is of pantiles. The bell turret is of Farnham bricks, laid with wide joints, with Ham Hill quoins, &c., and holds three bells, which are rung electrically from the vestry.

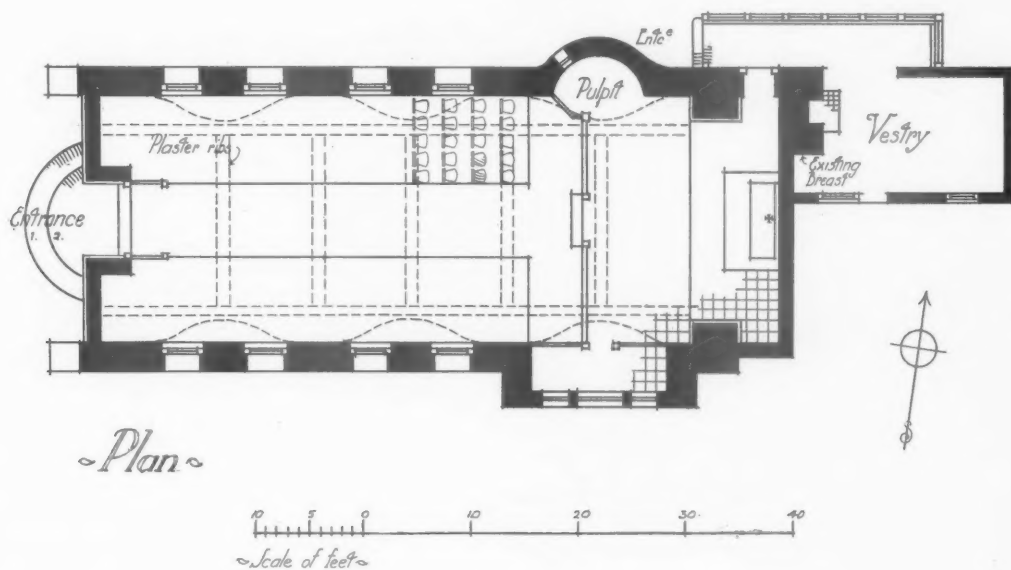
The screen shown in the interior view is gilded as regards the upper part, and the lower part, together with the pulpit, is painted dark green. The flat bands in the ceiling are also gilded, as are also the soffits of the bonnet heads. The plan was originally arranged for a picked choir of four,

or at most six, singers in the transeptal recess on the north side, but accommodation has now been found for a small surpliced choir in the chancel.

The fresco decoration is interesting as having been executed directly on the wet plaster according to the process of Keim of Munich. The artist was Mrs. Lea-Merritt, and the subjects of her life-size panels are illustrative of events in the life of our Lord. The crucifix window in the pulpit recess is by F. Hamilton Jackson.

The builders were Brown Bros. of Bramley. The heating apparatus and arrangements were carried out by John Grundy, London. The marble work recently executed (most of which is a memorial to the late Sir William Roberts-Austen, through whose instrumentality the church was mainly built) was by John Daymond & Son, London.

The wall lining is composed of bands of light and dark alabaster, the large upright slabs, 7 ft. long, being cut and opened to match the figure. The chancel arch, with soffit 4 ft. 6 in. wide, together with the face, has also been lined with alabaster in light and dark bands. The recesses for pulpit and organ are treated in the same manner.





GENERAL VIEW FROM THE WEST.

Photo: Arch. Review Photo, Bureau.

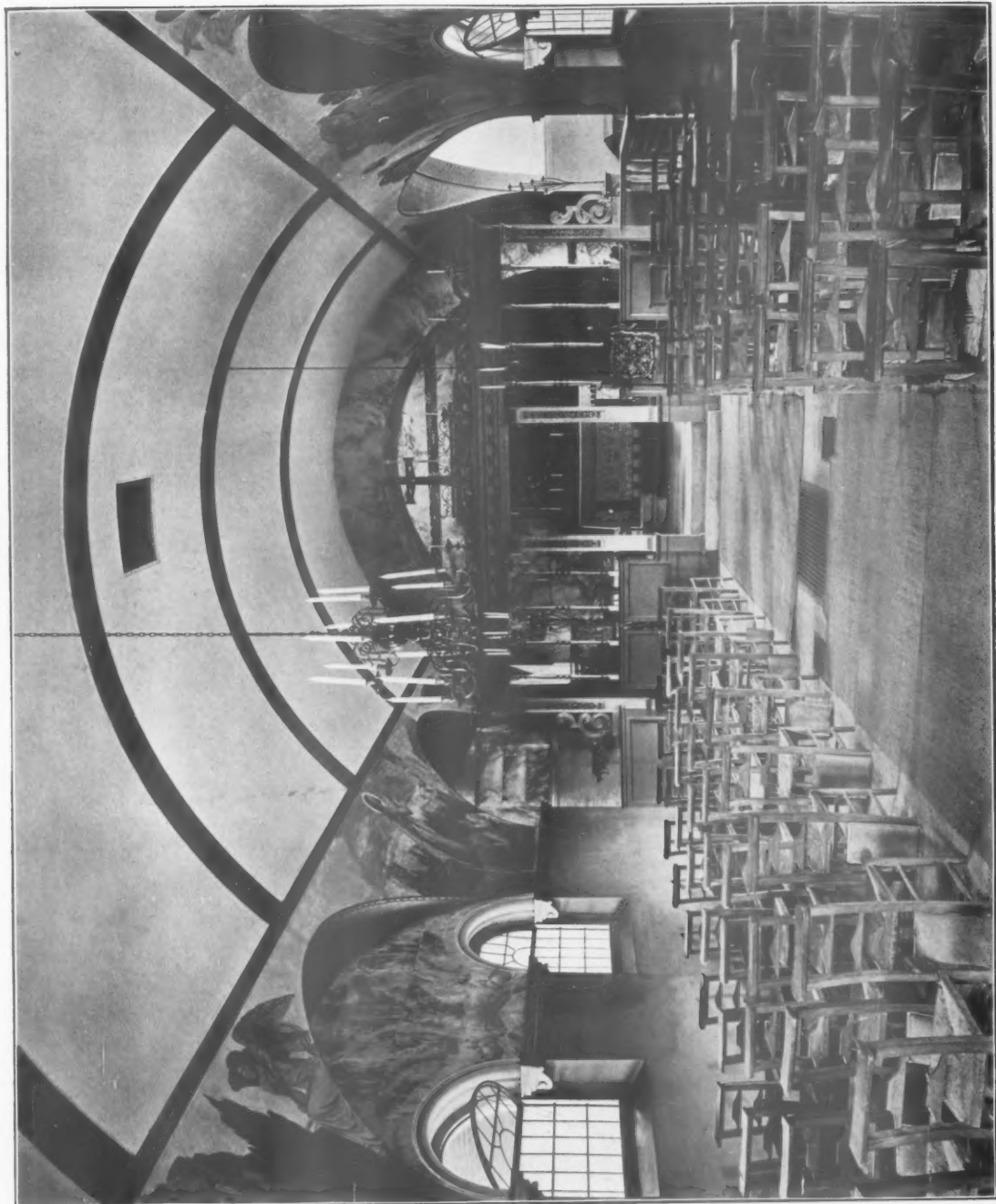


Photo: Arch. Review Photo. Bureau.

GENERAL VIEW OF THE INTERIOR.

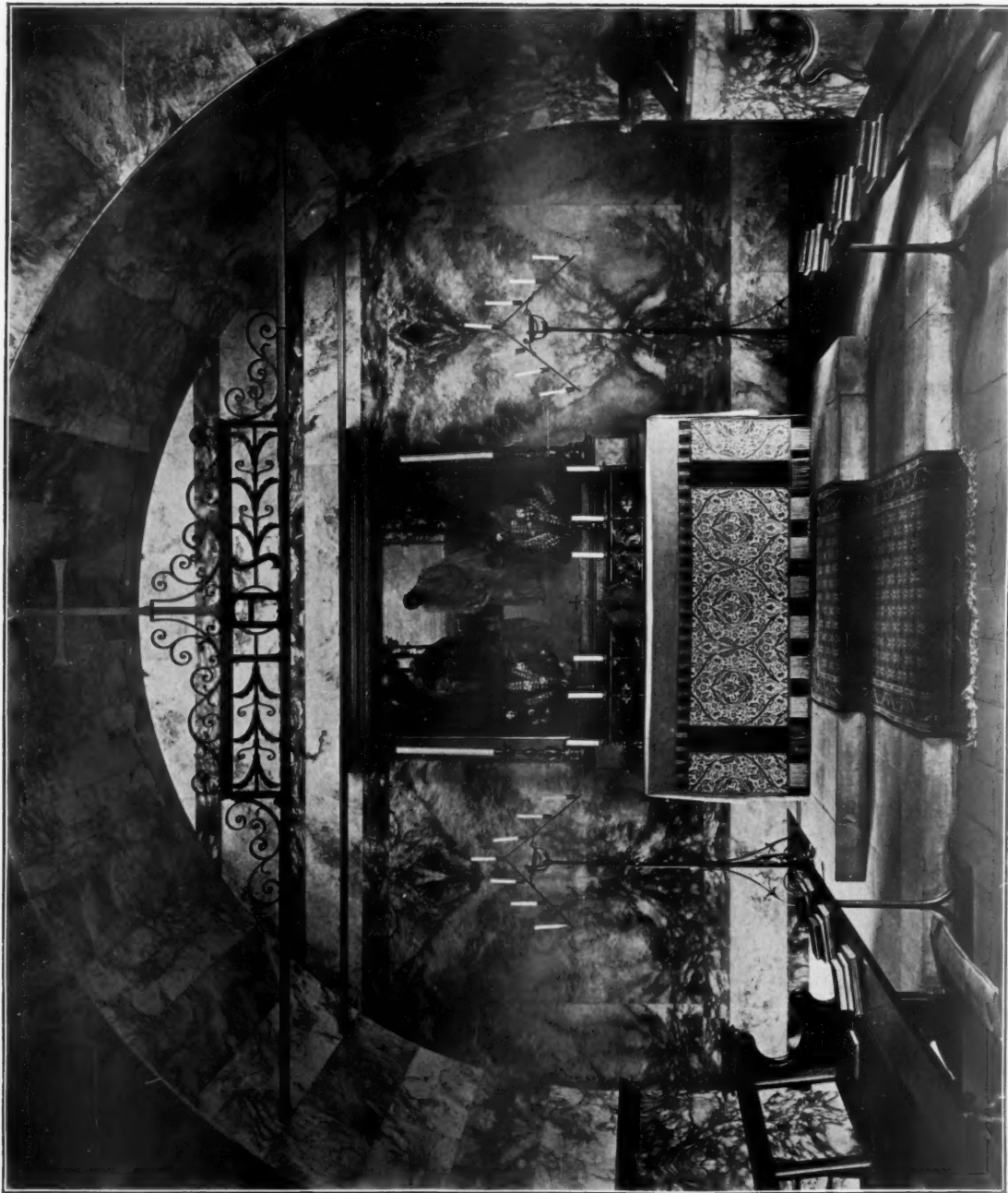


Photo: Arch. Review Photo Bureau.

THE REREDOS.

Church of St. Swithin, Hither Green, London.

Ernest Newton, Architect.



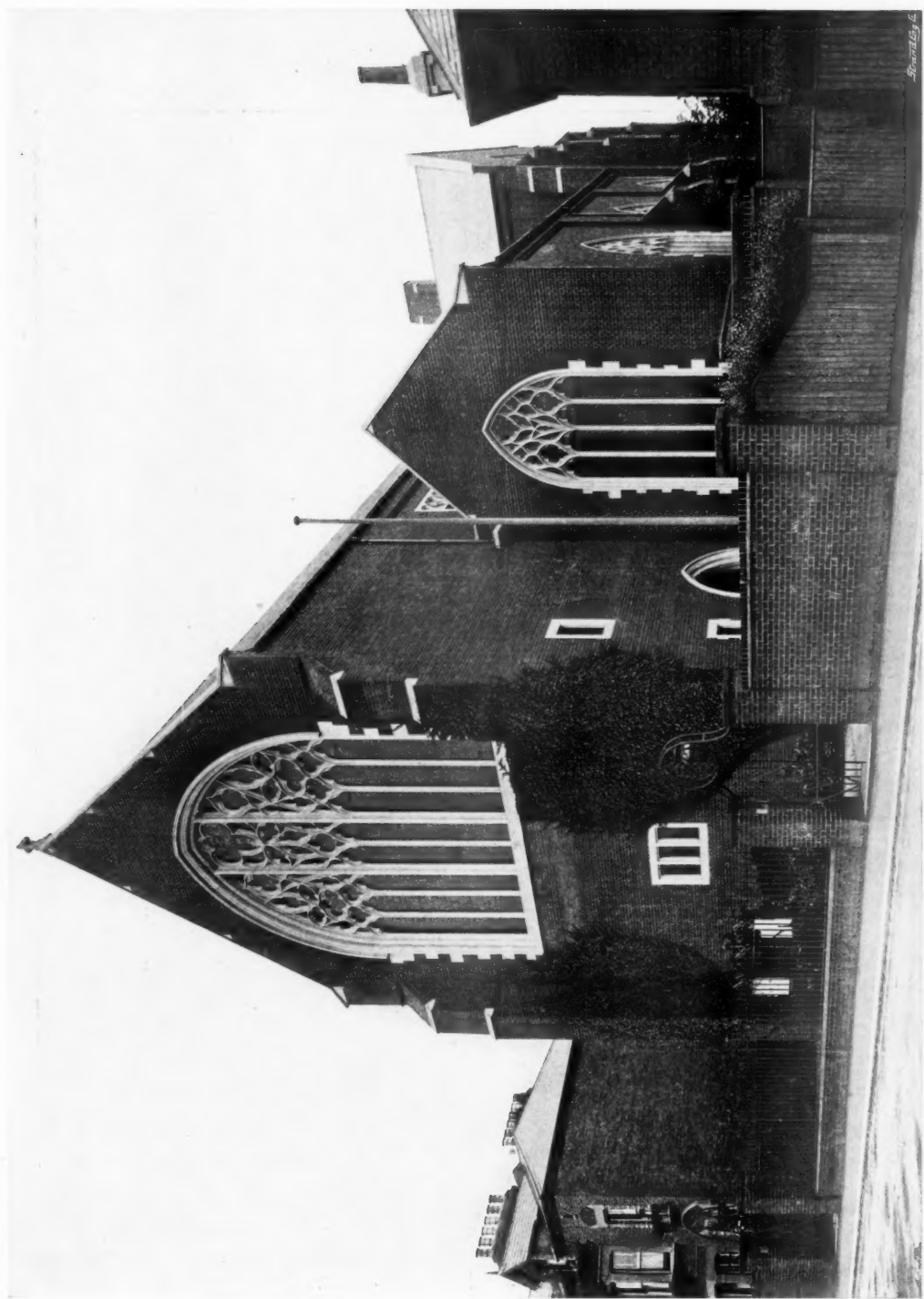
INTERIOR, LOOKING EAST.

Photo: Arch. Review Photo. Bureau.



THE nave and aisles were built in 1892, the builder being Samuel Parmenter of Brintree; the chancel, &c., in 1903. The building is faced with Pascall's Wrotham bricks and dressings of Box Ground Bath stone, all the exterior stonework being whitewashed when finished. The

roofs are covered with green slates. Internally the church has barrel ceilings, and the plaster is left rough-faced. The chancel floor is temporarily paved with red tiles; the altar hangings, stalls, &c., are also temporary. The general contractors for the chancel and transepts were Maides & Harper, of Croydon. The gas work was done by Charles Farris, and the heating was carried out by John Grundy.



VIEW FROM SOUTH-WEST.

Photo: Arch. Review Photo. Bureau.

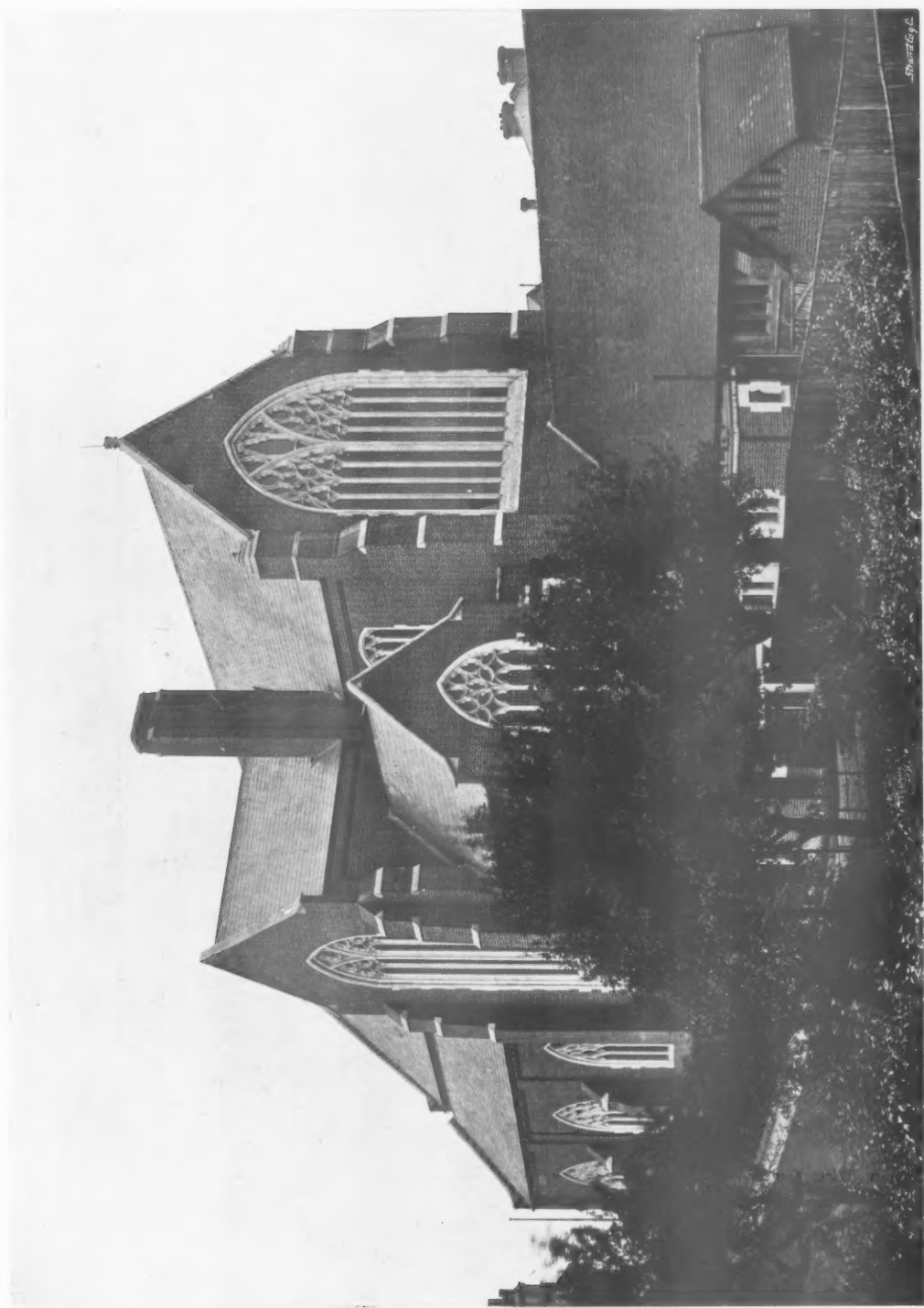
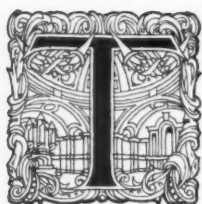


Photo: Arch. Review Photo, Bureau.

VII FROM THE SOUTH-EAST.

Ullet Road Chapel and Hall, Sefton Park, Liverpool.

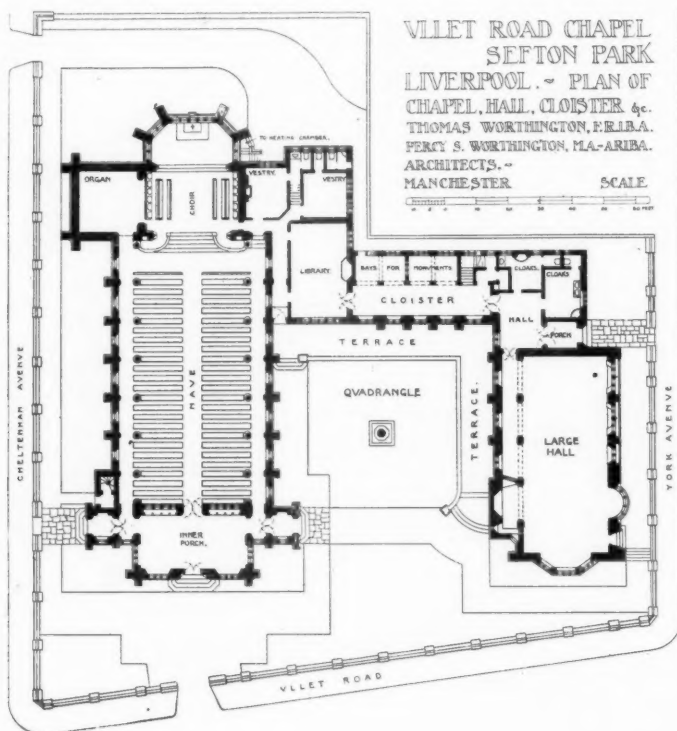
Thomas and Percy Scott Worthington, Architects.



HIS group of buildings was erected in two parts. The first part consisted of the church, together with the vestries and library, and the second of the large hall and cloisters which were due to the munificence of Sir John Brunner, Bart., M.P., and the late Mr. Henry Tate. The church is upon the west side of a

stone with oak woodwork and panelling. An interesting feature is the decoration in the vestry and library by Professor Gerald Moira for Sir John Brunner, of which some illustrations are given.

The contractors for the hall and cloisters were Hatch & Sons, of Lancaster, who are responsible for the excellent oak work throughout the whole of the group. The contractors for the fabric of the church were Tomkinson & Sons



courtyard which lies open to the south, and upon the east is the large hall with other rooms on the first floor and in the basement. These two are connected on the north by a closed cloister, off which open a series of bays containing monuments, many of them commemorating names honoured in Liverpool history. The exterior is of red Ruabon brick and Runcorn stone, and the interior is finished almost entirely in

of Liverpool. The carving was modelled by Mr. Miller, of Earp, Hobbs & Miller, except the reredos, which was the work of H. H. Martyn & Co., Ltd., of Cheltenham, and the stall canopies, which were carved by C. J. Allen of Lancaster. The metal-work was mostly by R. L. B. Rathbone, including some hammered copper doors. The electric fittings came from the Artificers' Guild, London.



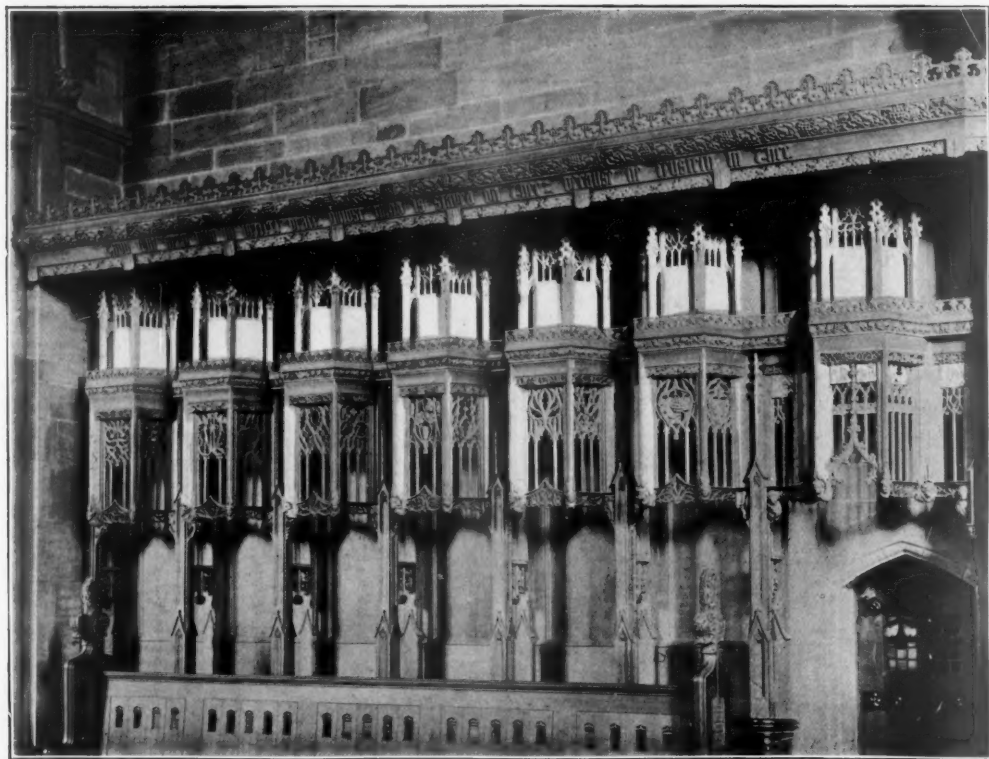
GENERAL VIEW OF EXTERIOR OF CHURCH AND HALL.



DETAIL VIEW IN THE HALL.



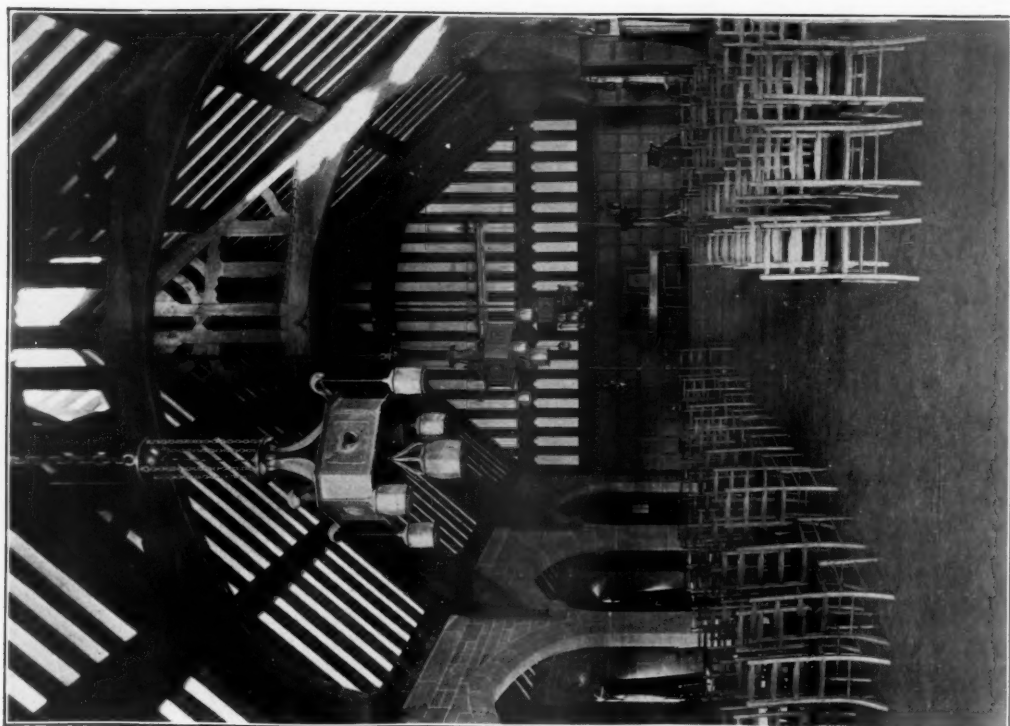
CHERUB-HEAD CARVINGS FOR THE FONT. C. J. ALLEN, SCULPTOR.



THE CHOIR STALLS. C. J. ALLEN, SCULPTOR.



GENERAL VIEW OF THE INTERIOR OF THE CHAPEL, LOOKING EAST.



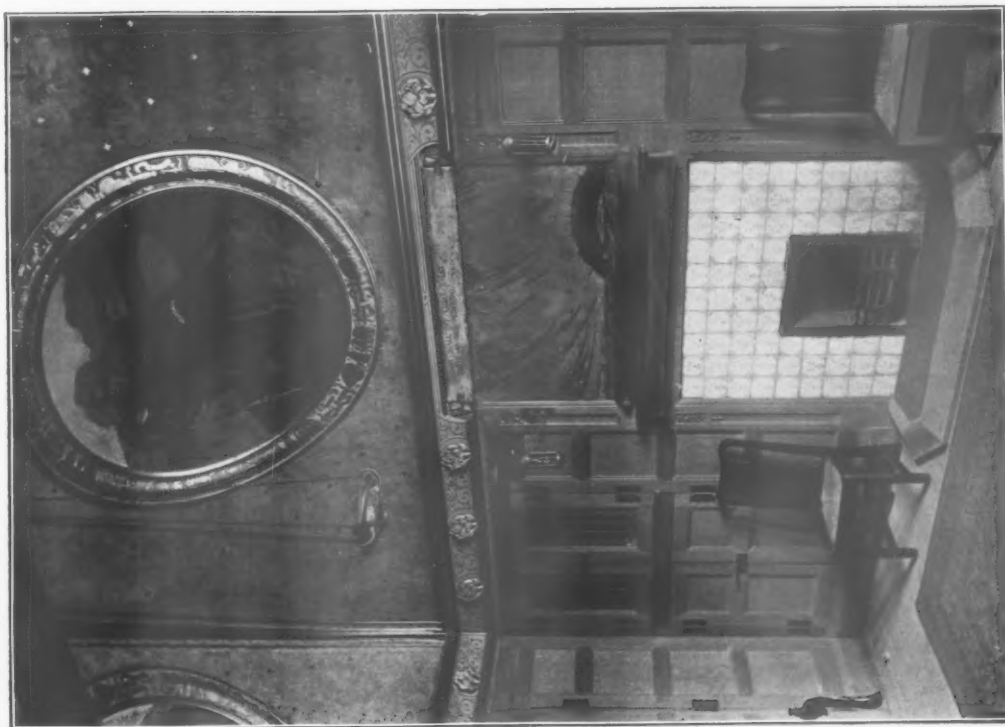
GENERAL VIEW OF THE INTERIOR OF THE HALL.



THE TERRACE, LOOKING TOWARDS THE HALL.



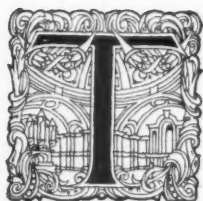
INTERIOR OF THE LIBRARY.



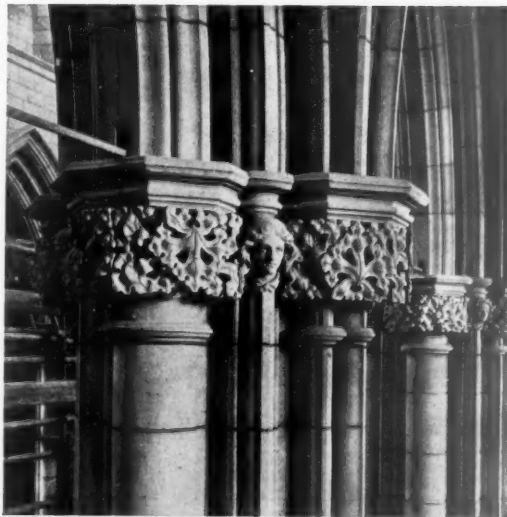
THE VESTRY : PAINTED CEILING AND PANEL
BY PROFESSOR GERALD MOIRA.

The Choir, Downside Abbey, near Bath.

The Late Thomas Garner, Architect.



THE history of the community of St. Gregory's at Downside in Somersetshire dates from the year 1814, when the monks acquired the estate of Mount Pleasant, Downside, with some 66 acres of land. Previously the Order had, following the suppression by Henry VIII of the religious houses, kept together in France, and after the Revolution in France had enjoyed the hospitality of a Shropshire baronet until they purchased their own property as stated. To the existing house was added, in 1823, a Gothic block of classrooms and cells from the designs of the late Mr. H. E. Goodrich of Bath, which building was, however, entirely altered and reconstructed in later years. In 1853 Mr. Charles Hansom designed a large school block which was added; but the numbers in the monastery grew and the school so increased that it became necessary in 1870 to



DETAIL OF CAPITALS.



DETAIL OF CAPITALS AND BOSS.

consider a further expansion on a considerable scale. The new plans provided for a monastery with proper accommodation and room for expansion; a church where the services could be carried out on a fitting scale; a block to comprise new kitchens, a new refectory, and a new dormitory for the school.

These additions were embodied in a plan prepared by Messrs. Dunn & Hansom, and the work was forthwith put in hand. In 1876 the new building, containing the kitchens and refectory, with dormitory over, was opened, and the new monastery, and the cloister connecting it with the refectory building, were also completed and occupied in this year. The foundation stone of the new church had also been laid by Dom. Bernard Murphy, Prior of Downside, at the time the other buildings were commenced, but the erection of the structure was not proceeded with until 1878, when Prior Gasquet carried the scheme forward. The transepts were opened in July, 1882, and in 1888, during the first term of office of Prior Edmund Ford, the Lady Chapel was finished, to be succeeded by the rapid completion of the Chapels of the Sacred Heart, St. Benedict, St. Isidore, St. Vedast, St. Joseph, St. Placid, Our Lady of Pity, St. Sebastian, and the English Martyrs. In June 1899 the late Pope Leo XIII raised the monastery to the rank of an abbey, Prior Edmund



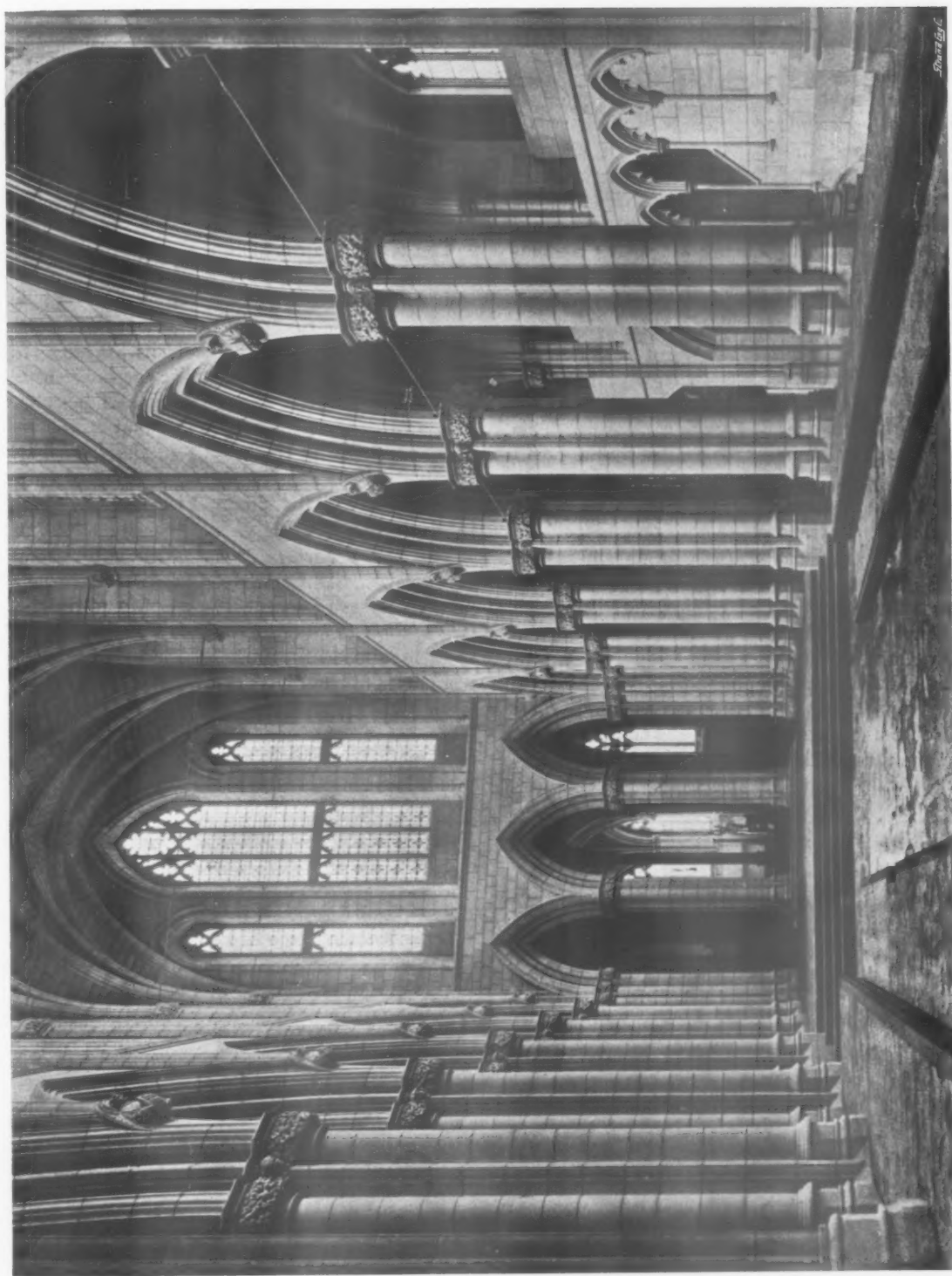
GENERAL VIEW OF DOWNSIDE COLLEGE AND ABBEY FROM THE SOUTH.



THE ABBEY, FROM THE SOUTH-EAST.



GENERAL VIEW OF THE CHOIR, LOOKING EAST.



VIEW OF THE CHOIR, LOOKING TOWARDS THE SOUTH CHOIR AISLE.

Ford, then serving his second term of office as Prior, becoming the first Abbot.

The addition of a choir and presbytery to the abbey was commenced in July 1902, the design being that of the late Mr. Thomas Garner, who, in 1900, succeeded the late Mr. Edward Hansom as architect to the community. Messrs. Dunn & Hansom's work embraces the existing transepts, the tower, and the eastern chevet of chapels. Many modifications of detail were made in the course of construction, all tending to make the building more ornate or decorated in style, instead of the sterner Early English originally contemplated. It was intended that the choir should have five bays only and an apse, the Lady Chapel beyond having a square end. When the latter came to be built two more bays were added to the choir, and the chapel was built with an apse, grouping two or three hexagonal chapels on either side after the manner of French cathedrals. This arrangement was afterwards varied on the south side by the erection of two oblong chapels in late Perpendicular style. Between these eastern chapels and the transepts there is on either side of the church a series of chapels forming a sort of outer aisle, those on the south being raised up some thirteen feet to allow space for the north cloister beneath them.

Mr. Garner altered the plan of the choir, providing a bold square end in place of the apse, and as the foundations of the apse were actually completed he used them to support the columns of the feretory, thus partly preserving the former scheme,

and joining his square-ended choir to the curved line of chapels already built, so that no change of plan can be perceived.

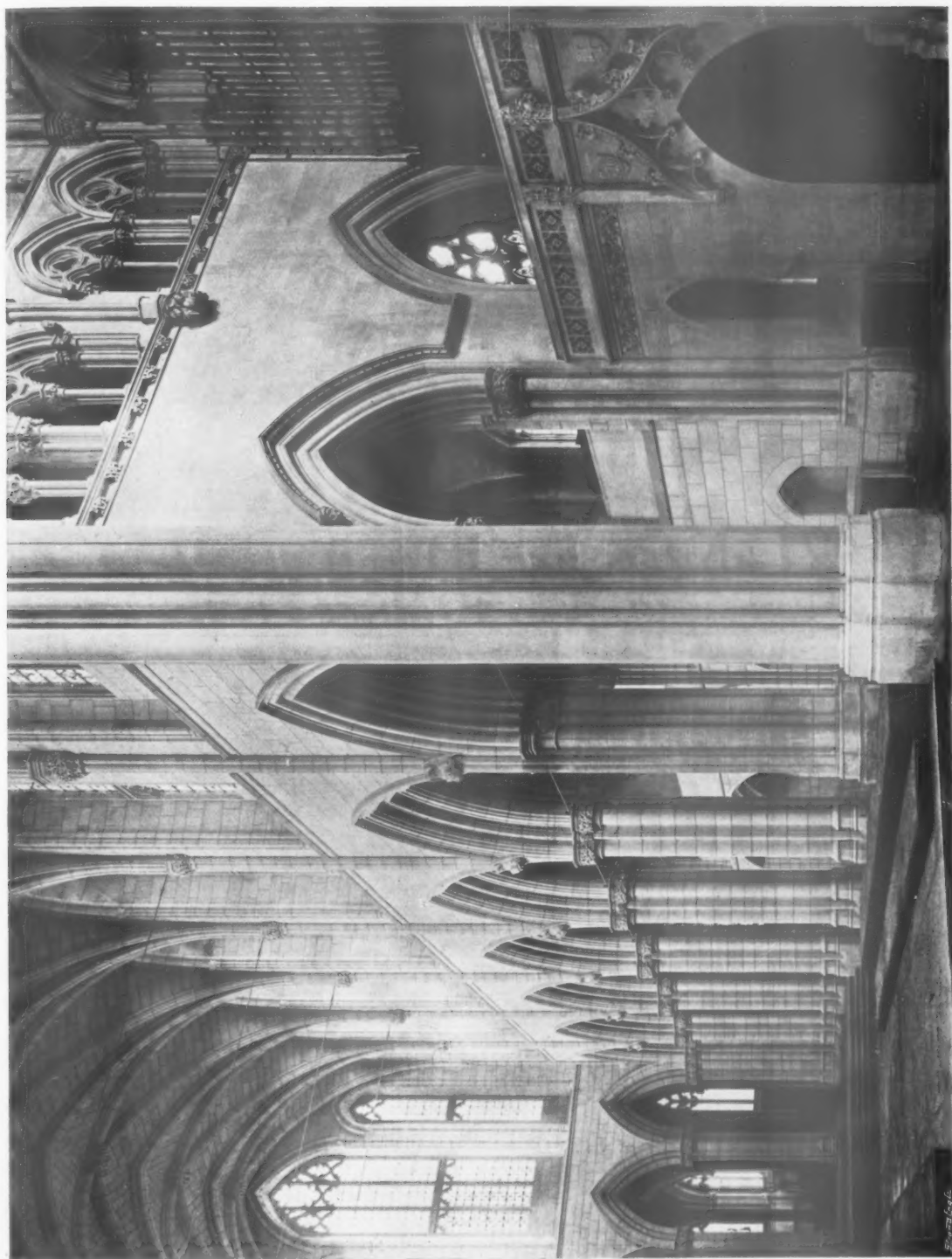
The style of the new choir is typical of the transition from Decorated to Perpendicular. Mr. Garner's design increased the thickness of the walls, lengthened the clearstory windows, and simplified the vaulting. Basing his treatment on a precedent at St. Albans Abbey he introduced a single light at either side of the central east window, thus enhancing the effect of space and loftiness.

The portion of the church thus gradually completed from the eastern bay of the nave to the end of the Lady Chapel measures externally 230 ft.; the breadth across the transepts and tower is 125 ft. In the interior the transepts are 83 ft. long, 68 ft. high, and 25 ft. wide; the choir from the chancel arch to the columns behind the altar measures 95 ft. long, 28 ft. wide, and rises from 68 ft. to 70 ft. by the middle of the third bay. The building is constructed of Bath stone (supplied by the Bath Stone Firms, Ltd.) both internally and externally.

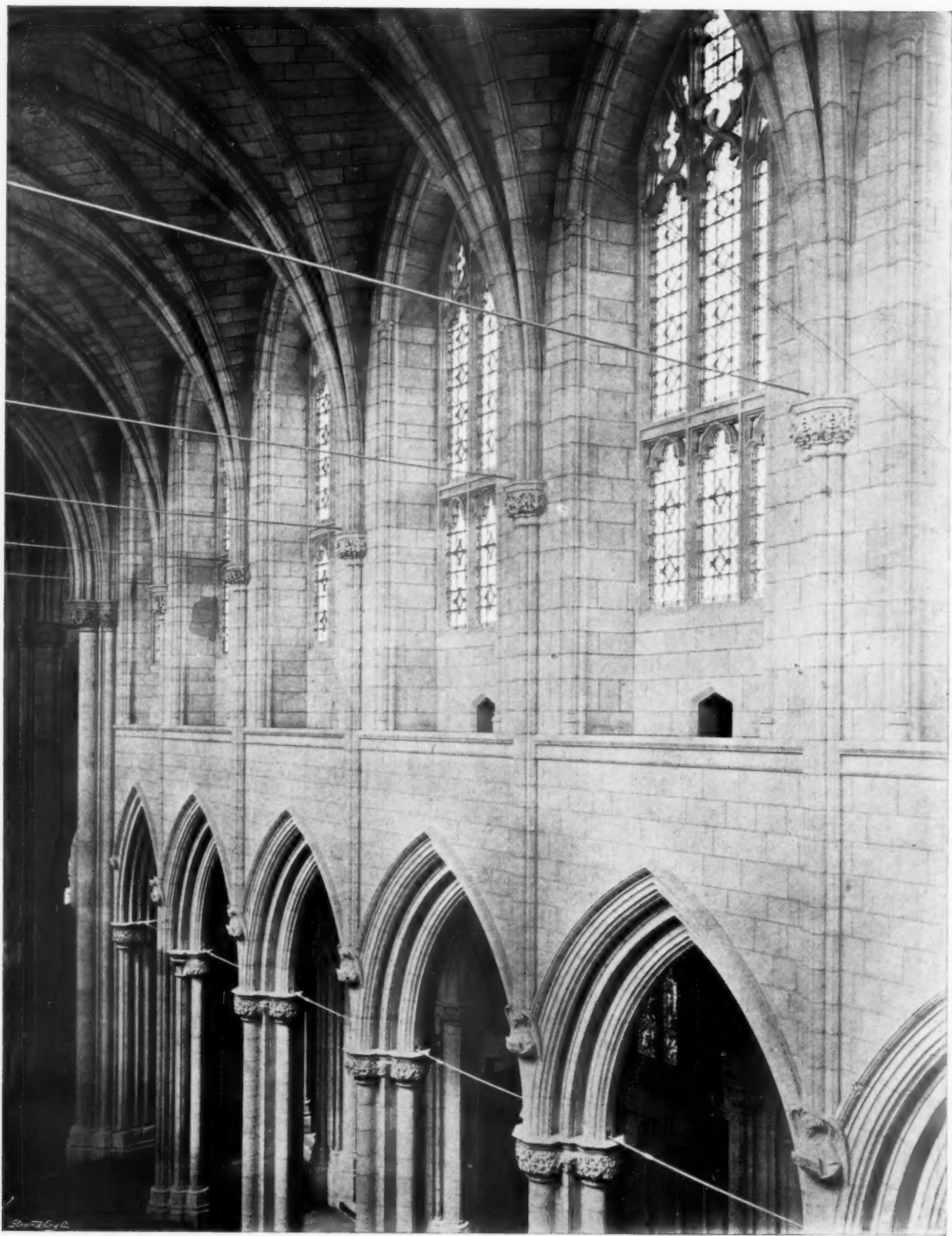
The Rev. Dom. F. P. Whiteside, Bursar at the college, was the builder. The tiles were supplied by Craven Dunnill & Co., Ltd., and the roof tiles by Ernest Matthews & Co. The leaded light work is by Rowe Brothers & Co., and the brasswork by Barkenton & Krall. J. Crispin & Sons, Ltd., carried out the heating; F. Braby & Co., Ltd., the copper roofing; and Spooner, Garrard and Amphlett erected the organ.



DOWNSIDE COLLEGE.



THE SOUTH TRANSEPT.



THE TRIFORIUM AND CLEARSTORY WINDOWS.



THE FERETORY.



CHAPEL OF ST. ISIDORE.

Morden College, Blackheath, Kent.—II.

TO return to a consideration of the building itself. It was carried out by Edward Strong as master mason, and the details suggest that the general scheme (see illustration), which is masterly, was alone supplied by Wren, and that in this case he did not supply drawings of the "mouldings in great," as he has recorded his willingness to do for another and more important work of his, and it cannot be said that the entrance doorway reaches anything like the standard of its supposed prototype at Bromley, as may be judged from the illustrations.

The similarity between the two affords strong evidence that the door at Morden College was actually copied from the last-mentioned example, otherwise it would be difficult to explain the inferiority of the Blackheath design. A badly-made sketch by Strong would, however, account for this.

In other respects the present building is an improvement upon the earlier one.

The plan consists of a colonnaded quadrangle



THE MAIN ENTRANCE.

Photo: Percy Green.

VOL. XXIII.—D

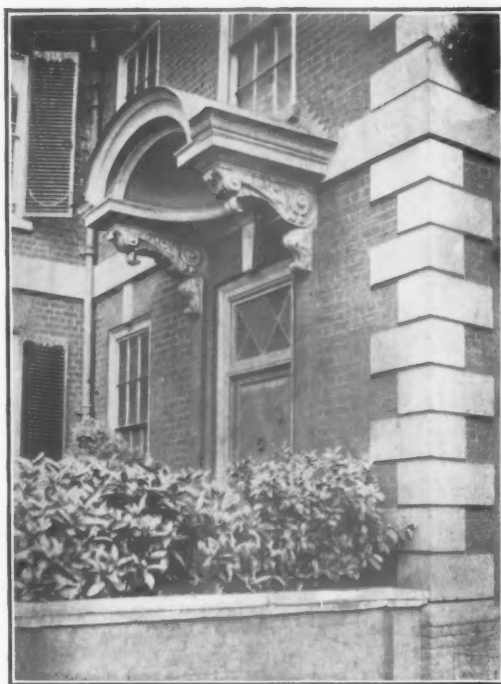


Photo: Percy Green.

THE HOOD TO WEST ENTRANCE OF SOUTH WING.

about 100 ft. by 80 ft., surrounded by the rooms of the members. The axial lines correspond with the points of the compass, and the chapel is centrally placed on the east side opposite the main entrance.

The setting-out is well worthy of study, the projections are the legitimate expression of the parts of the plan, and the positions of chaplain's and treasurer's houses are well contrived to give them their requisite importance on the front elevation and access to quadrangle at rear.

The suites for the clerk and another official, both of which have more accommodation than those for ordinary members, are arranged at the sides of and over the two vestibules. The kitchens and room marked "Recreation-room," which may have been the original dining-room, again project from the main line, and passages by same originally leading to gardens occupy positions corresponding with the extra space given to the chaplain's and treasurer's houses. The servants' quarters are arranged above the kitchens, and the nurses provided to attend upon sick members were housed above the recreation-room till quite recently.

The main front toward the west is entirely symmetrical, the central portion, marking position of quadrangle, being flanked by projecting

*Telephoto by E. W. M. Wonnacott.*

DETAIL OF HOOD: WEST ENTRANCE, SOUTH WING.

wings, which contain the treasurer's and chaplain's houses at north and south ends respectively.

The angles of wings are strengthened by projecting stone quoins, as are the projections marking the entrance doorway and those which include the two suites of rooms on either side, and give excuse for the pediment, containing the figures of Sir John Morden, the founder, and Dame Susan, his wife, which emphasises the centre of the composition.

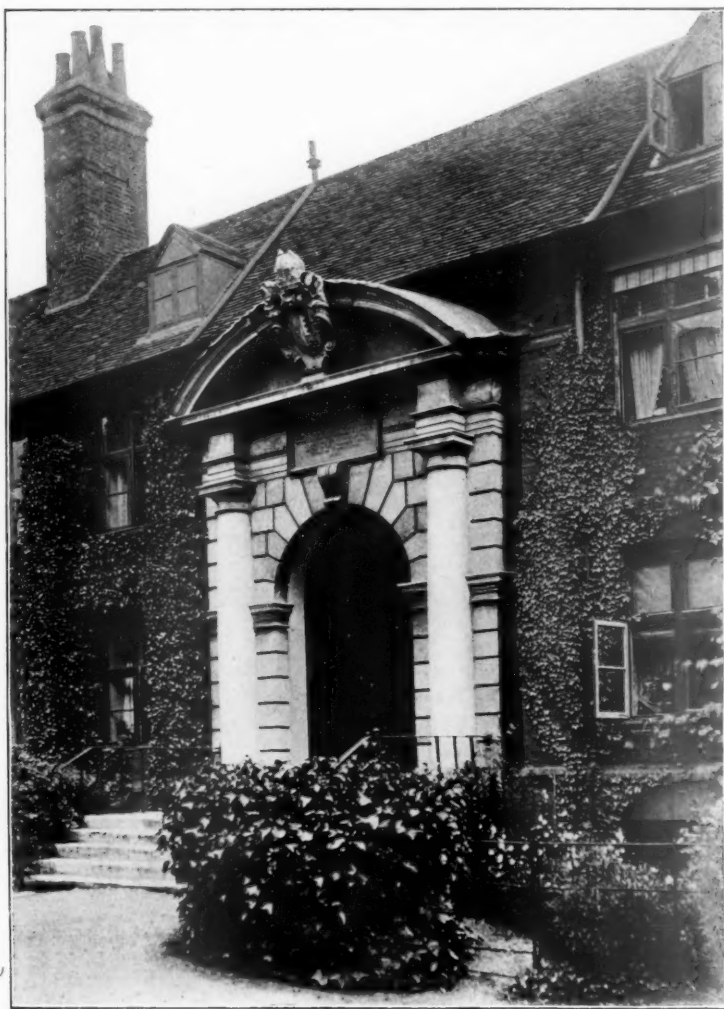
It may here be noticed that the cornice on front has carved modillions, but that the north and south returns have plain square modillions, the moulded cornice extending only as far as the houses. The wings containing members' rooms are lower, and finished on the outer faces with a cement cove only.

The entrances to the houses occupying the wings were formerly by doors facing towards the main entrance, which with the wood-hoods and brackets over them still remain. New entrances have since been formed and the original doors with the windows at sides of same blocked up, the modernising of the houses internally rendering fire-places necessary in their stead. These hoods are of good design and the brackets are well carved, as reference to the illustrations will

show. The dwarf wall in front is modern.

The walling generally is of brown bricks with red quoins to window openings and at angles of chimneys, &c., the body of the latter being, however, of yellow stock brick. The cornices are of wood and strings of stone like the quoins at angles of west front. Both stone and woodwork are painted a cream colour, and the colour effect is quiet and good; or was until lately, for during the recent alterations the whole was re-painted and the effect at the moment rather startling. Time will, however, remedy this once more.

The main entrance is flanked by stone columns carrying a segmental stone hood, and the door is enclosed by a three-centred arch of poor outline. The keystone is



BROMLEY COLLEGE: THE MAIN ENTRANCE.

Photo: C. H. Freeman.



THE WEST FRONT.

Photo: Edwin Gunn.

carved with cherub heads, and the spandrels have poor carving of a naturalistic type. Reference to the fact that this doorway is evidently a poor copy of that at Bromley has already been made. The door itself of oak is well moulded and has a postern for occasional use, a flight of three semi-circular steps leading to entrance. Above, on a cartouche, are the arms in heraldic colourings of Morden and Brand flanked by swags of fruit and flowers, carved in stone and painted.

In the pediment over are niches, containing figures of Sir John and Dame Susan Morden "which afford correct instances of the costume of a man and woman of Rank at the Court of Whitehall." They are in stone, painted, and the former was inserted by Dame Susan after her husband's death in 1708, her own statue being added by the trustees at her decease in 1721.

Set between the twin roofs covering the building and immediately over pediment, is a turret bearing a clock with faces on west and east sides, over which is a bell set between the columns, upon which the hours are struck.

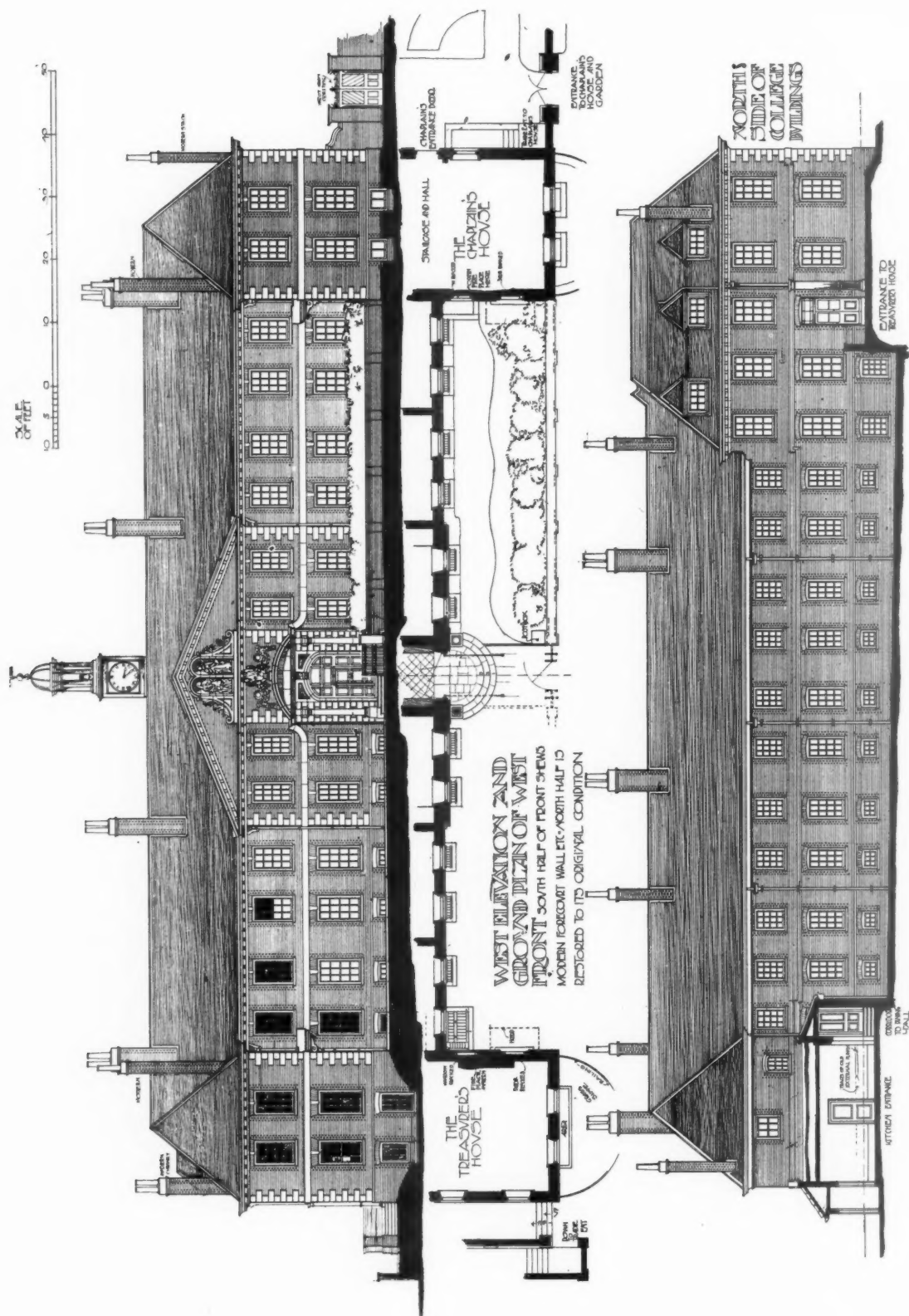
Entering by a simple vestibule lined with the broad panelling of Wren's School, and having seats with well-turned legs at each side, one enters the turfed quadrangle. It is quiet and restful in effect, the colour scheme excellent, and the whole of good proportion. The upper rooms are brought out over stone columns of Wren's favourite Doric, set

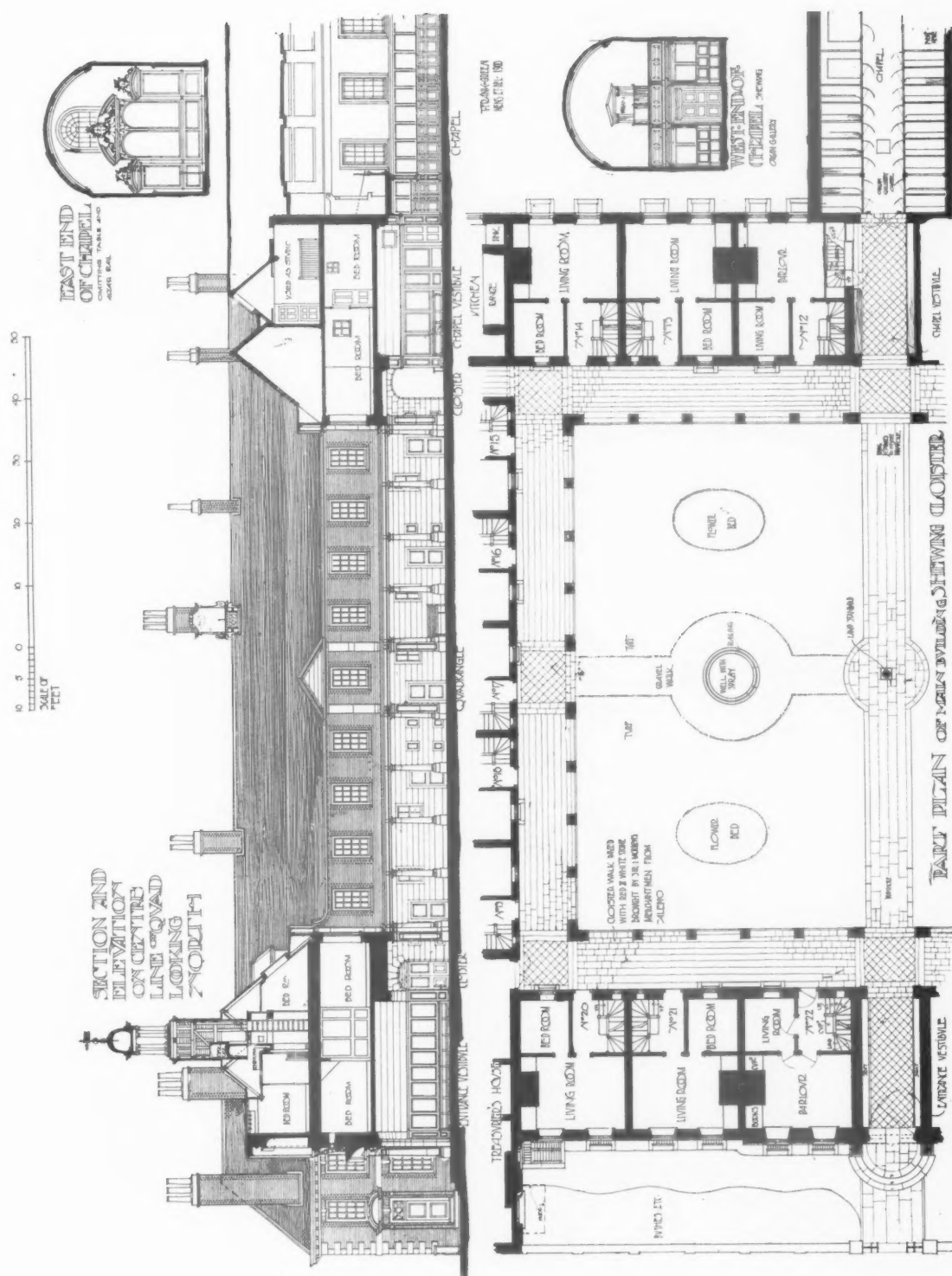
upon square plinths, the entablature carrying wall being of wood, as is the modillion cornice which, under the eaves of tile roofs, completes the design.

The colonnade is continuous on the four sides, except in angles and centre of each side, where square piers and half-columns occur, in the latter case being carried up to form breaks, surmounted by alternately straight-sided and segmental pediments which break the long line of cornice and give emphasis, just where required, to what might otherwise have been a rather wearisome repetition of similar features.

The west wing is somewhat higher than the others, and this accounts for the ramping up of cornice at west end of north and south fronts shown upon the sections. Upon one of the chimneys of the north wing is a sun-dial facing the quadrangle. This was placed in position by the trustees in 1725. The back wall of colonnade is of cement, lined over with sham stone jointing.

Criticism may be fairly made upon the setting-out of the quadrangle; one cannot but feel that it would have been more in accord with architectural truth if a column or pier had occurred under the walls dividing each suite, so that the supports explained the plan. The difficulties in the way of such a re-arrangement are obvious on the plan, but could hardly be considered insuperable to such a man as Wren.







THE QUADRANGLE FROM SOUTH-WEST CORNER.

Photo: Percy Green.

As on the outer elevations, the whole of the stone and woodwork except the vestibules is painted a cream colour, as also is the cement wall at back of colonnade previously mentioned.

Stone flags, alternately red and white, form the paving of colonnade and both vestibules, the same material being used for the path opposite main entrance, and the material is said to have been brought by Sir John from Aleppo. The gravel paths crossing the quadrangle from north to south are later in date.

In the centre is a standard formerly holding an oil lamp, but now converted for gas. The shaft is a fluted Doric column in iron, from which spring cast-iron scrolls supporting lanterns on either side, the column being surmounted by a "classic" vase. North and south of the flagged path are wells of small depth only, which were originally intended for use with the old manual fire-engine, made in 1751 (at which time the wells were formed), as the result of a gift of £100 from Richard Chiswell, Esq. The engine still remains in the coal-cellar at rear of chapel.

T. FRANK GREEN.

(To be continued.)

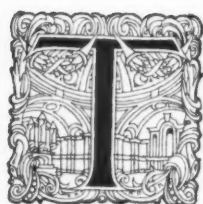


Telephoto by E. W. M. Wonnacott.

DETAIL OF CONSOLE IN CENTRE OF WEST SIDE.

The Baptist Church House and Kingsway Chapel, London.

Arthur Keen, Architect.



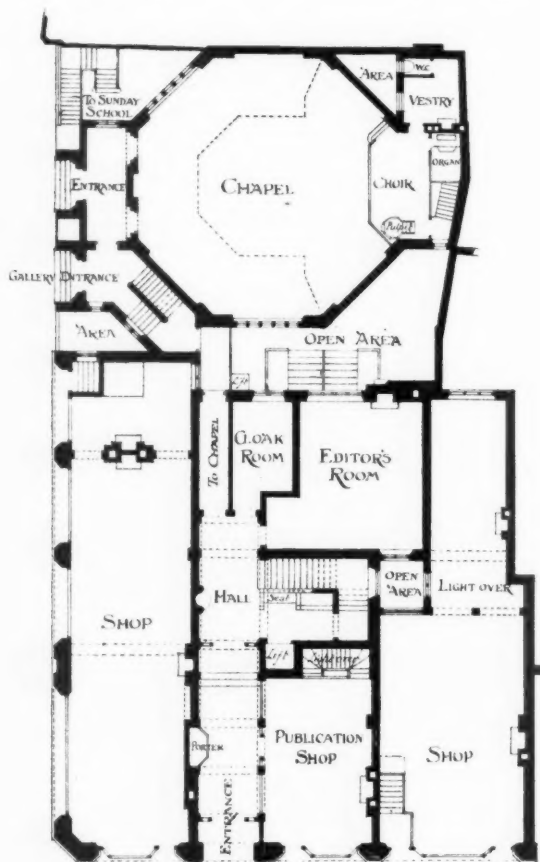
HIS building is in the widened portion of Southampton Row which forms the continuation of Kingsway, and it was the first to be erected in connection with the new thoroughfare. The Kingsgate Baptist Church, which is part of the block, takes the place of a former chapel, and is the third one to occupy its site.

The building is the headquarters of the Baptist Union, and in addition to numerous offices and committee-rooms it contains a library 46 ft. by 26 ft., a council chamber 35 ft. by 26 ft., a large visitors' room, and a publication department.

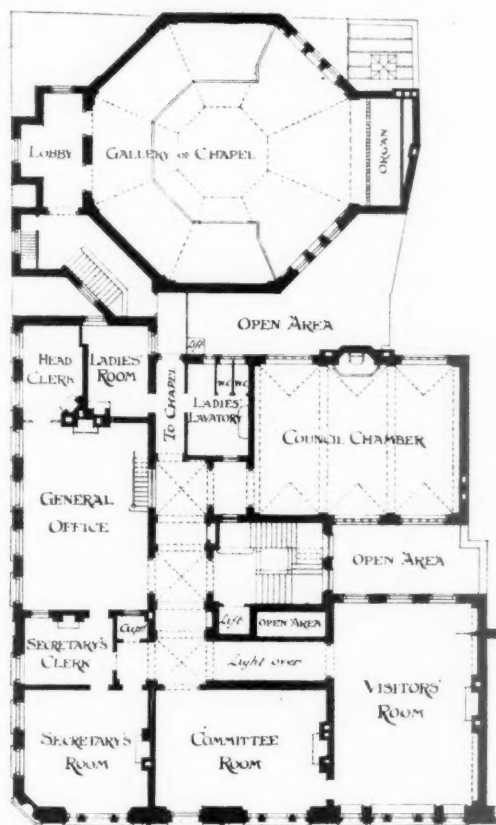
Oak panelling and inlaid woodwork have been

used freely in the principal rooms, the corridors are paved with black and white marble tiles in patterns and ceiled with groined vaulting, and the staircase to the first floor is in Hopton Wood stone with massive teak balustrades. The modelled plaster ceilings were carried out by Lawrence Turner; a bronze statue of the late C. Haddon Spurgeon, which stands in the entrance-hall, was the work of F. Derwent Wood, and the figure of John Bunyan at the corner of the building was done by Richard Garbe. Two terra-cotta presentation panels, modelled by George Tinworth, have been set in the chimney-pieces of the council chamber and the visitors' room.

It was at first intended to build the library over



PLAN OF GROUND FLOOR



PLAN OF FIRST FLOOR

10 20 30 40 50 60 70 80 Feet



Photo: Arch. Review Photo. Bureau.

GENERAL VIEW FROM SOUTHAMPTON ROW.

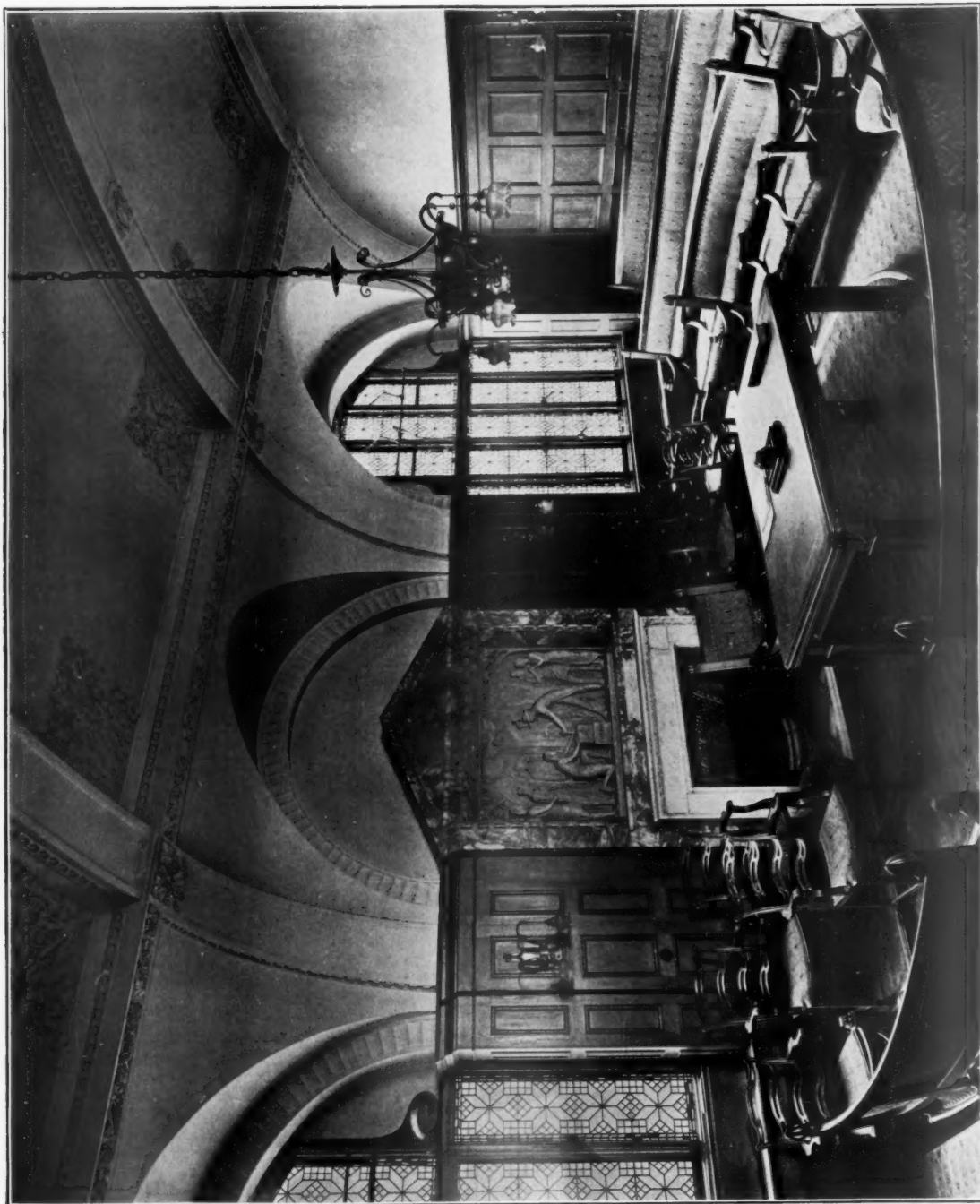


Photo : Arch. Review Photo, Bureau.

THE COUNCIL CHAMBER.



THE LIBRARY.

Photo: Arch. Review Photo Bureau.



VISITORS' ROOM.

Photo: Arch. Review Photo. Bureau.

the chapel, and the octagonal form was adopted to facilitate the lighting of the chapel, but this idea was abandoned to save time in settling a point raised by the district surveyor under the Public Buildings portion of the Building Act, and the chapel was therefore given the benefit of a domed ceiling with a lantern light above it. The panels in the base of the dome, modelled by Mr. Garbe, illustrate the various trees men-

tioned in the Bible. The organ was built by Norman & Beard, under the direction of Fred Gostelloe, and is of most beautiful tone, although it is a small instrument and a comparatively simple one. There is a large Sunday-school under the chapel. The elevations of the buildings are in Portland stone and Borough Green red bricks. The total cost of the work was about £40,000.

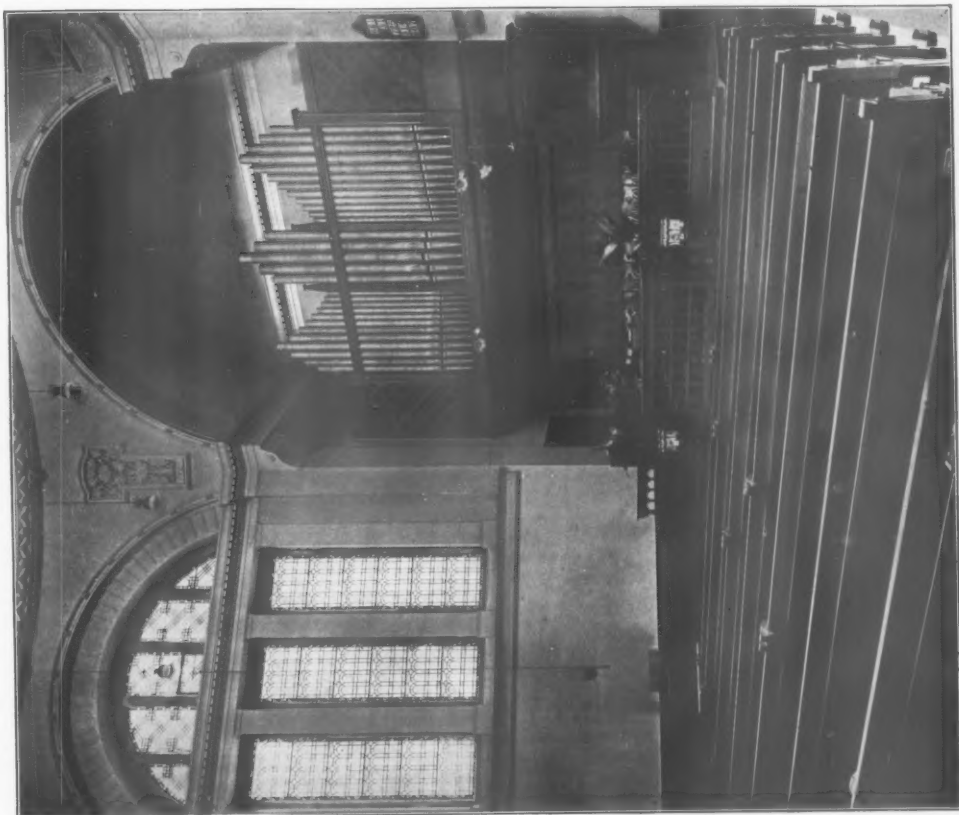
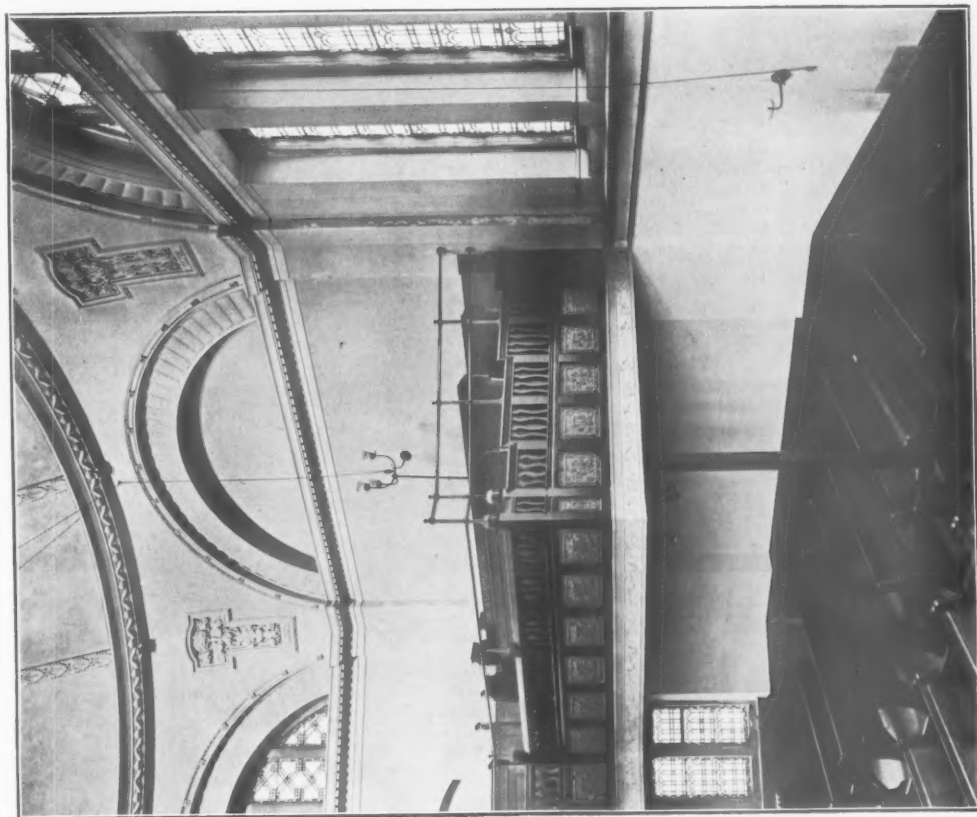


Photo: Arch. Kedden Photo. Bureau.

ALSO ORGAN AND ROSTRUM.



KINGSGATE CHAPEL, SHOWING GALLERY--



COMMITTEE-ROOM.

Photo: Arch. Review Photo. Bureau.

The Late G. F. Bodley, R.A.

[The following notes, additional to the article by Mr. E. P. Warren in our November issue, will be of interest.—EDITOR]



MR. BODLEY'S opportunities came early, and very soon after the completion of his articles his first church, that of St. Michael's at Brighton, was entrusted to him. With this building, now ruined by overwhelming and incongruous additions by another hand, he struck at once the note which ever characterised his work, that of refined dignity. In this church, as in several subsequent buildings, Mr. Bodley sought the assistance of other youthful master hands. One friend, William Morris, contributed the glass that fills the western windows, while another, Edward Burne-Jones, painted the triptych for the high altar. His first co-operation with William Morris was, however, in a church built by him at King's Stanley, in Gloucestershire, and here Morris found, at his friend's hands, the opportunity for his first essay in church glass.

His close and intimate connection with the Pre-Raphaelite Brotherhood is one of the most interesting facts of his early life, and naturally led to frequent collaboration. He shared to the full the mediæval fervour of the brethren; his own poetic temperament, and intense love of music and of colour, led him perhaps more especially towards Dante Gabriel Rossetti, for whom, and for whose work in poetry and painting, he always cherished the very highest regard. Holman Hunt alone of the group has survived him. Amongst architects Butterfield, for whose work and abilities he had a profound respect, and Street, were also amongst his early friends. At St. Martin's, Scarborough, typical of its author's manner, he employed the services of Madox Brown, Rossetti, and William Morris, for various decorative accessories. Mr. Bodley had recently entered upon a second partnership with a former pupil, Mr. Cecil G. Hare, who had for many years assisted him.

The Principles of Dome Construction.—I.



IN a paper published in the *Journal of the Royal Institute of British Architects* (21st May, 1904), I have shown how the stresses in a thin dome of spherical, conical, or other shape may be obtained in a simple manner when it is constructed of material capable of resisting both tension and compression, such as steel or reinforced concrete. That discussion, starting from a simple plain frame and proceeding to the dome of ribs and rings, arrived at the case of the true dome by imagining the ribs and rings multiplied indefinitely. It left out of account the stresses due to the elastic deformation of the dome.

The stresses on an arch of elastic material such as steel, of known dimensions and subject to definite loads, are nowadays obtainable by methods which, taking account of the changes in shape of the arch ring due to the loading, ascertain therefrom the resulting stresses with considerable accuracy. The elastic theory of arches—built up by the labours of many men during the last fifty years or so—has enabled the engineer to design and construct large metallic bridges with a confidence in his knowledge of the effects produced which is justified by results.

Arches of concrete, brick, and stone, which I shall class together under the name Masonry, are constructed of material of much more uncertain character, and in such a manner that changes in the shape of the arch ring are not necessarily either the cause or effect of such stresses as accompany similar changes in continuous metallic arches. Even if the masonry arch ring were monolithic and not jointed, the modulus of elasticity of the material is not constant, but varies with the load; and as it is the relations between the stress, the strain, and this modulus of elasticity, which enable us to determine the first-named, the elastic theory

is not so applicable. It is, however, used for the investigation of large masonry arches as the most accurate method known, and within certain limits (*e.g.* where the equilibrium polygon lies within the middle third of the ring) is rightly applied. For smaller arches of brick and stone in which the disturbing elements are of greater importance, the approximate method based on Moseley's principle of least resistance, first published in 1833, is still adopted.

In a dome the stresses are much more complicated than in an arch, and though M. Levy in "*La Statique Graphique*" has given a method which takes account of this elastic deformation, it is of so intricate a nature and so based on assumptions which are not applicable to masonry that it is little used in practical work. In the arch we only consider the stresses on the two beds of the arch stones or on two radial sections of the arch ring (unless of course in such cases as wind pressures, which we exclude for the moment), as in Fig. 1 (*a*). In the dome, on the contrary, the stones are subject to stresses on all four faces, as in Fig. 1 (*b*). Any particle of metal in a continuous metallic dome is also subject to pressure on all four faces.

If the keystones of an arch are removed the arch must collapse; if the stones in a dome corresponding to the keystones are removed the dome need not fall. The reason is that the horizontal thrust necessary for equilibrium, which in an arch can only be supplied by the keystones, can be supplied by each ring of stones. Any tendency of the lower stones to collapse inwards causes them to press inwards upon each other, so producing a pressure upon each lateral face. The resultant of the reactions on the two lateral faces is a horizontal pressure outwards, by which each ring of stones supplies the horizontal outward thrust which the keystone in an arch gives. For instance, in Fig. 2 let the part above the upper parallel be removed; the stones forming the upper parallel such as A will be held in position by the reactions on the lateral faces *f* and *g*, and the reaction *h* of the course below.

Early writers, such as Navier and Rondelet, divided the dome into a series of imaginary arches, intersecting at the crown, where the width of the arch becomes zero, and treated these arches

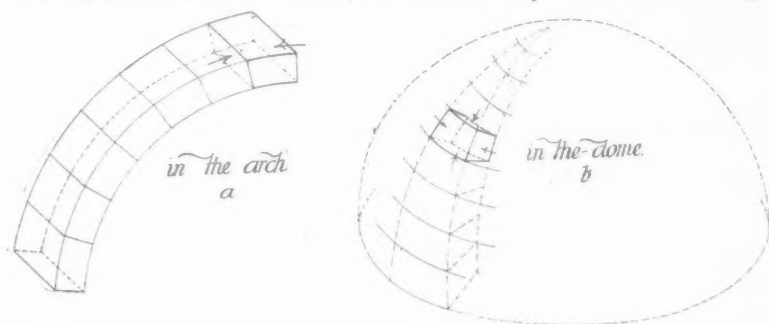


FIG. 1.

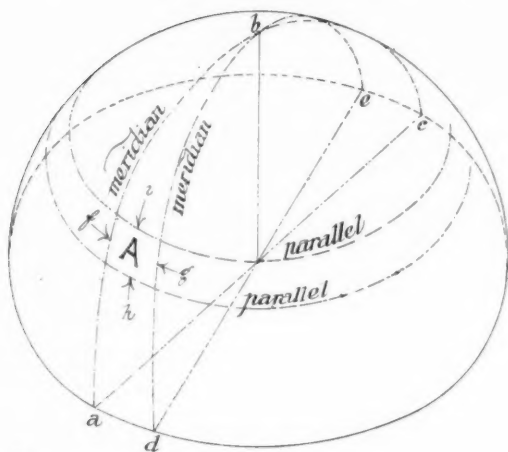


FIG. 2.

as if sustaining a finite thrust upon an infinitely narrow keystone. That is, they assumed that the dome is divided into a series of lunes as in Fig. 1 (b), each opposing an exactly similar and opposite lune. The thin edge of the topmost stone could not of course sustain any thrust. As an example of this theory see Mr. Wyndham Tarn's discussion of the dome of Santa Sophia in the *Transactions of the Royal Institute of British Architects*, Vol. VIII, new series, p. 247.

Their theories and those of the later writers who, following them, take no account of the lateral pressure on the dome are thus erroneous. Little indeed was known of the correct theory of the arch itself until the latter end of the eighteenth century, when Coulomb, in 1773, Navier, Rondelet, Poncelet, Persy, and others in France applied themselves to the consideration of the problem. In England, Moseley in the *Philosophical Transactions* in 1837, and in the "Principles of Mechanics" in 1840, made a distinct step by his enunciation of the principle of least resistance, i.e. that the thrust of an arch due to its loading is the least consistent with equilibrium. Méry in the "Annales des Ponts et Chaussées"; Hagen and Weisbach in Germany; Barlow in the *Civil Engineer's and Architect's Journal* in 1847; Rankine in his well-known text-book, and Durand-Clay and Winkler in more recent days, have each contributed to our knowledge of the masonry arch.

Such knowledge as we have of the real stresses in domes we owe to Rankine, who gave in his "Applied Mechanics" the correct analytic solution of the dome of thin material capable of resisting tension and compression; to Scheffler, whose "Theorie der Gewölbe" contains the application of Moseley's principles of least resistance to domes, and whose methods are to-day generally used; to Durand-Clay and Maurice Lévy in France, and to Eddy in America. Eddy's "New Construc-

tions in Graphical Statics" contains a valuable contribution to the subject, in that he shows a new method of drawing directly the line of least thrust on the supposition that there is no resistance to tension on the meridian planes. Schwedler also contributed largely to the proper construction of framed domes, but his work is mostly confined to metal framework.

It is desirable to briefly recall the nature of stresses on domes before describing some of the various types which have been erected.

Let Fig. 2 represent a hemispherical dome, and A a portion of it bounded by two meridians abc and dbe (similar to sections on the lines of longitude on a globe), and by two horizontal planes similar to two parallels of latitude.

Any such particle as A in a dome of material capable of sustaining stresses of tension and compression, is subjected to stress on all four faces. The stresses on the upper and lower faces, which we shall call parallels, are always compressions whatever be the section of the dome; the stresses on the planes abc , dbe , which we shall call meridians, are either tensions or compressions, or zero, varying in nature and amount with the section of the dome and the position of the particle in question. These stresses are frequently called hoop tensions and hoop compressions. The stresses on the parallels may be called direct thrusts.

If we have a hemispherical dome of uniform thickness, small in proportion to the span of the dome, and of a material capable of sustaining tension as well as compression, the stresses on the meridians vary, as shown on Fig. 3.

If we have a similar hemispherical dome but with an opening in the centre at top, such as in Fig. 4, the stresses on the meridian planes are similarly tensions and compressions with a point of zero stress, but this point is not at an angle of $51^{\circ} 49'$ from the vertical as before, but at a greater angle, which varies with the amount of the opening.

If this last dome is surmounted by a cupola or lantern, the extent of the tensile stress is increased and the point of zero stress rises (see Fig. 5). It is always below the opening, as there must be a ring round the opening in compression, but with a heavy lantern or wide opening it is close to it.

Concrete, stone, and brick are not well adapted for resisting tensile stresses, and if the dome below the point of zero stress cannot supply the necessary resistance on the meridian planes it splits into separate segments, lune shaped, which act as a series of radiating arches stressed on the upper and lower beds only, i.e. on the parallels in Fig. 2.

It may thus burst apart in radiating lines near

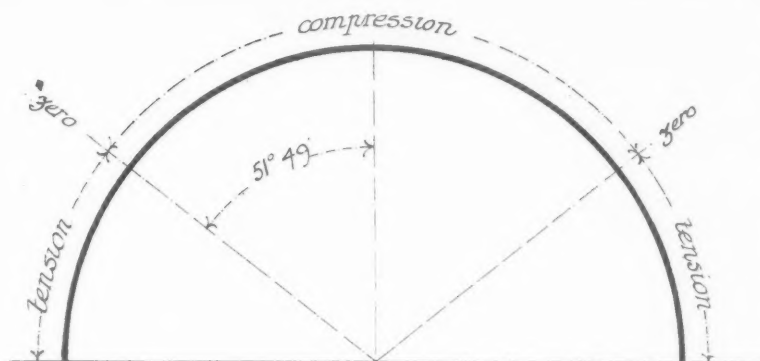


FIG. 3.

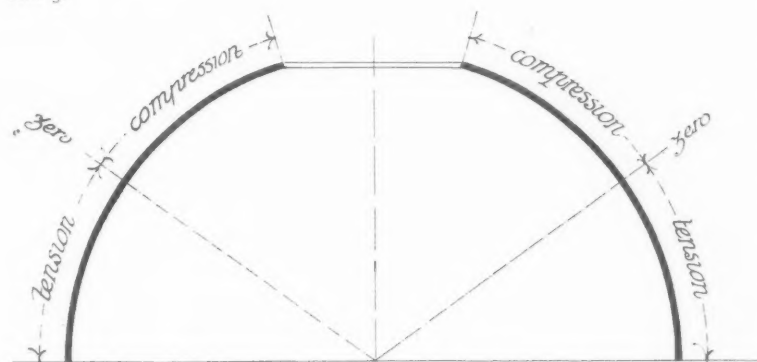


FIG. 4.

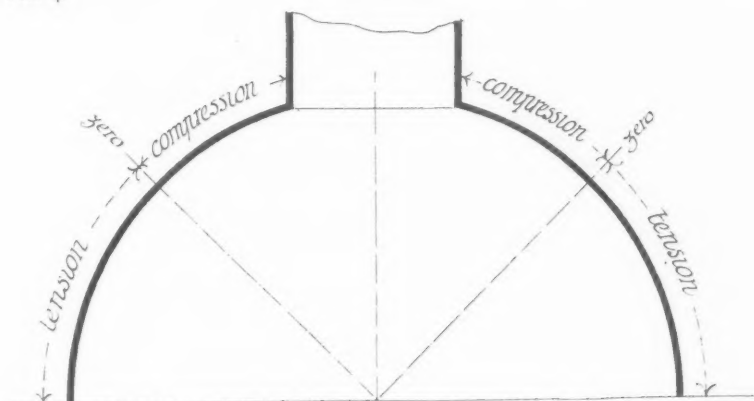


FIG. 5.

the bottom, and yet be quite stable if the abutment is secure. The brick dome of Santa Sophia is an example of a dome in which the architect appreciating this has formed windows round the base, so that the construction in the lower part is a series of forty-four separate radiating arches (see Fig. 6). These arches, which are quite separated at the bottom by the intervening windows, appear to extend to near the summit of the dome. The filling in between the arches from a point not far above the windows must, however, be subjected to lateral compression of the type *f* and *g* in Fig. 2. Below that point of zero stress the architect has so constructed his dome that it does not require tensions on

the meridian planes to give it stability. It requires, however, either a sufficient abutment or a tie, and the latter was inserted by Fossati. It is said that the brick joints instead of radiating from the centre are at a flatter slope, and radiate from the opposite base line. This would be of some help in enabling the builders to do without centering to a point nearer the top, but would have no effect on the final stresses on the dome. This kind of dome with radiating arches in the lower part, and windows between, is used in the Mosque of the Sultan Suliman, also in Constantinople; in the monastery of St. Luke at Phocis in Greece, and elsewhere.

In such a dome as St. Peter's in Rome, Fig. 7, the heavy lantern would cause the point of zero stress in a true dome to rise near the top, as in Fig. 5, putting tension on all the meridian planes below it, and the designer very properly constructed it not as a true dome, but of a series of sixteen stone arches, filling in a brick covering set herringbone fashion on the exterior and interior face, so that it has the appearance in section of being a double dome. The filling, being incapable of resisting tension, cannot be reckoned as a source of strength in the lower part save in stiffening between the arches, and so resisting distortion: and the

arches should have been so designed that the line of pressure would be contained in the middle third. Apparently this was not done, as about 1743 the dome began to burst outwards, and ties were put round it as on the figure.

This form of dome, constructed of radiating arches with a filling or ribs between them, is a type of construction frequently adopted in brick and stone domes. The Baptistery at Florence, Fig. 8, and the Baptistery at Cremona, Fig. 9, are other examples of domes constructed of ribs or arches. Indeed the earliest Roman domes, such as that of the temple of Minerva Medica, Fig. 10, are constructed with ribs, and there is some reason to

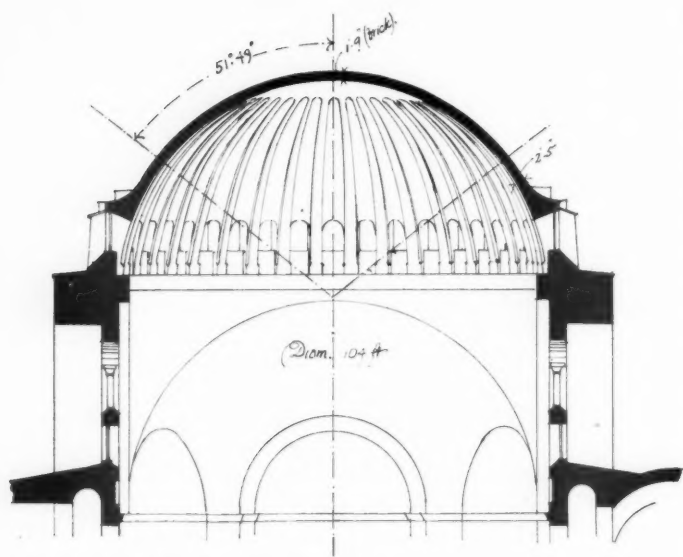


FIG. 6.—SANTA SOPHIA, CONSTANTINOPLE.

suppose that the Pantheon at Rome is of ribbed construction also.

Perhaps, however, the example which will make my point clearest is Brunelleschi's Duomo at Florence, illustrated in Fig. 11. In this eight large arched ribs spring from the angles of the octagon, while there are two intermediate smaller ribs between each pair. These are braced by cross arches, as in the illustration. That Brunelleschi thoroughly understood what he proposed is evident from the first paragraph in his report to the Convention of Architects and Engineers, who considered the question in 1420, previous to the building of the dome. In it he begins by saying that "the inner dome is to be turned from the octagon as pointed arches, which are better adapted to carry the weight of the lantern."¹

In Eddy's very beautiful discussion of the dome in his "New Constructions in Graphical Statics," he assumes that the true masonry dome is incapable of resisting the tensile stresses on the meridians, and gives a solution on this basis. Even if a masonry dome has no special provision for resisting these meridian stresses on the lower part where they are tensile, it still exerts considerable resistance to them by reason of the bonding of the stones or bricks.

For instance, in the dome in Fig. 12 there is a tendency to split apart, as shown by the open joints there. The vertical joints on the meridians may or may not be capable of resisting tension according as the builders have flushed up the joints solid or left them open; even if solidly made the resistance arising from the adhesion of the vertical faces must be very slight, but the

interlocking of the stones or bricks must offer considerable resistance to pulling apart. The weight of the upper part presses the stones together so tightly that the full resistance to tension of the stone may be developed. The tensional resistance of the stones may be further secured by putting slate dowels between the courses as at A, or with metal cramps as at B, or the stones themselves be mortised together as is sometimes done in lighthouses.

It would be in all cases, however, better practice either to construct the lower part where there are tensile stresses on the meridians as separate radiating arches, as we have seen the Roman and mediæval builders did, or provide continuous metal bands in each joint capable of sustaining the meridian or hoop tension where investi-

gation shows such tension to exist.

When the shape of the dome varies the stresses on the meridians correspondingly vary. The semi-circular section is generally used in small domes and in the Byzantine domes; it is used, for instance, in Bramante's dome in the Tempietto in S. Pietro of Montorio; in the S. Maria della Salute and the Redentore in Venice; in the Val de Grâce in Paris; it is used in the Mosque of Sultan Soliman and in Santa Sophia in Constantinople. But in the large domes of Europe from early Renaissance times a pointed form was also used; for instance, in the Duomo at Florence; in San Gallo's Church of S. Biagio Montepulciano (1518), in the Church of La Superga at Turin, and the Madonna del Calcinaiio near Cortone (1500).

The apex of this pointed dome is frequently completed by a spherical end, or the curve may be drawn from three or more centres as in Fig. 13. Of this type we have St. Paul's (the dome visible from the interior), the church of Sta. Maria di Carignano in Genoa, and the Madonna della Steccata at Parma (1530); Sta. Maria del Consolazione at Todi, attributed to Bramante, and others. In such cases it is of course impossible to locate the point of zero stress on the meridians without special inquiry. The stresses on the parallels are compressions; the stresses on the meridians—hoop stresses—and the point of zero stress on the meridians must be found by investigation.

If the section is that of a hollow cone, so that the sides are straight, the stresses on the meridians are always compressive, whether the cone be closed

¹ Note in the illustration the wooden tie which encircles the dome. It is of chestnut. Brunelleschi also proposed, in the report referred to, to bind the arches together with iron covered with tin, and with oak covered with plates of iron.

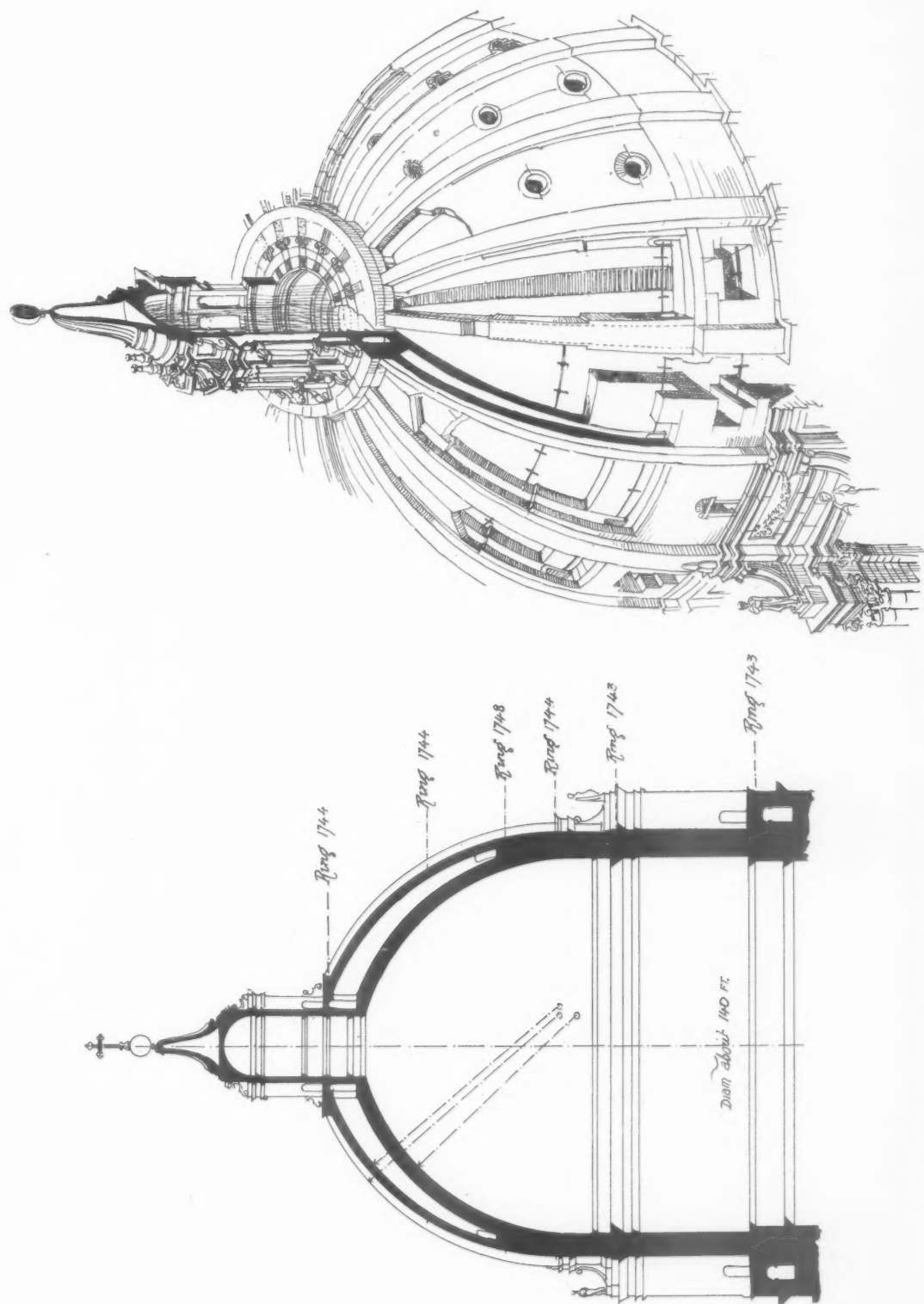


FIG 7.—ST. PETER'S AT ROME (AFTER DÜRM.).

or open or surmounted by a lantern at the top or not, provided that the base is not allowed to spread, *i.e.* that there is sufficient abutment or sufficient tie to resist the outward thrust. When, however, the top of the cone is closed by a spherical end, as in the Baptistery at Pisa and the cone of St. Paul's, this end exerts an outward thrust which affects the stresses on the meridians unless there is a tie at the base of the spherical part.

The cone is therefore an excellent constructive form for stone or brick carrying a lantern, as the materials are well adapted to resist compression, and no extraneous aid from metal bands or such-like is required, except at the base. If the abutment yields the lower part may split, as in the hemispherical dome in radiating lines, and the parts into which it is separated act as independent arches.

The thrust of a dome may be taken up by the dome itself if capable of resisting tension, just as an inverted saucer takes its own thrust, or it may be resisted by the abutments or by a tie or ties at the base or in the section at joints at and above the base.

A proper understanding of this question of thrust is so important to the architect or engineer that I shall venture to discuss the matter in a little more detail.

Let Fig. 14 represent a vertical section through the axis of a dome which is any segment of a hemisphere less than the half.

At the springing line there acts the direct thrust of the dome which is in a direction tangential (or nearly so) to the surface of the dome. Let the amount and direction of this over one unit length of the base (circumference) be represented by the line *ab*. It is resisted by the vertical reaction of the support equal to *bc*, and a horizontal thrust *ca*, which may be supplied either by the resistance of the abutment, or by a circular tie at the base of the dome. This circular tie may be considered as a part of the dome, in which case the dome may be said to exert no outward thrust on the abutment.

Suppose now that the dome is not segmental, but is a full hemisphere. In this case there is no horizontal component *ac*; the direct thrust being tangential is wholly vertical, subject to this important reservation, that the horizontal forces of the type *ac* in the part of the dome above the base have been taken up by the material of which the dome is composed, including ties or hoops built in it for the purpose.

I have shown in my paper already mentioned how it is that the horizontal stresses of the type *ac* are constantly increasing up to the point of zero stress. Above that point of maximum thrust the stresses on the meridian planes are compression, and below that tensions.

The effect of these tensions are to gradually resist the outward thrust until in the complete hemisphere that thrust is quite overcome, and there is none left to be taken up by the abutment. But if the dome is not capable of supplying these hoop tensions, if for instance it is formed below the point of zero stress by a series of separate arches, then there is the same outward thrust at the springing of the arches as there is at the point of zero stress.

In fact the part above that point forms the key-stone to all the radiating arches, and as in all arches the horizontal thrust is constant, we must provide for it either by a circular tie or by a proper abutment. In all domes, therefore, which do not spring vertically from these supports, there is an outward thrust to be resisted either by the material itself, or by something in the nature of a ring tie embedded in it at the base, or by the support acting as abutment. In domes which do spring vertically from the abutment there is or is not an outward thrust according as there is or is not in the material of the dome above the springing sufficient resistance to the thrust.

A single tie at the base is sufficient if the springing line is at the point of zero stress—about $51^{\circ} 49'$ in spherical domes of uniform thickness—because the dome above that tending to fall inwards causes compression in the meridian planes. If the springing is below that point ties are required at intervals below the joint, or the material itself must be capable of resisting tension.

Early domes were usually constructed without a roof over them, so that the actual dome may be seen externally, as, for instance, in the temple of Minerva Medica and in the Pantheon at Rome (second century), Santa Sophia at Constantinople (sixth century), and in the cathedral at Aix-la-Chapelle (beginning of the tenth century).

In St. Vitale at Ravenna, a dome of the sixth century, there is a covering roof of but slightly greater elevation than the dome itself, but in St. Mark's at Venice (eleventh century) the domes are covered with roofs, also of the domical form, of much greater height than the actual domes, and designed to give external expression to these as well as to afford protection from the weather.

These domes, therefore, appear in section as double—inner and outer domes. One of the most interesting examples of the double dome is that of the Baptistery at Pisa (Fig. 15), to which I shall refer later.

In the time of Wren we find domes of triple section.

The Dome des Invalides in Paris (end of the seventeenth century) has an inner dome with a very large central opening or eye, through which is seen a middle dome closed at the top, which

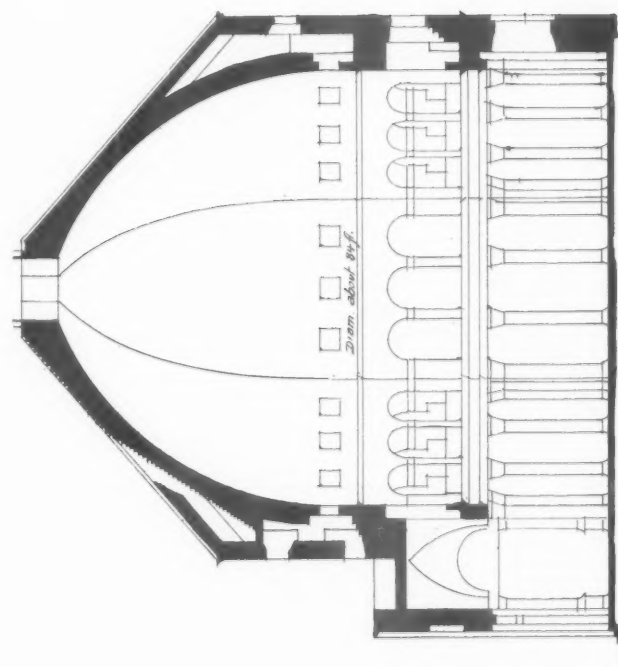


FIG. 10.—TEMPLE OF MINERVA MEDICA.

SECTION (AFTER HÜBSCH).

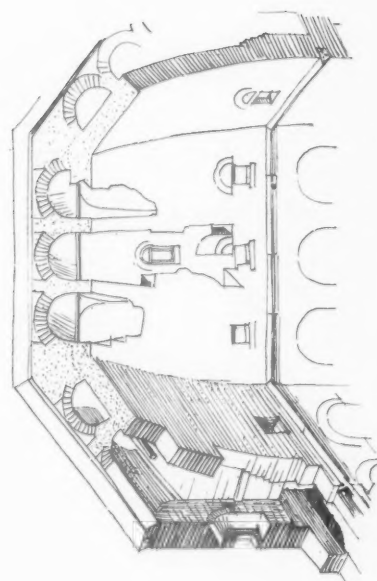


FIG. 8.—BAPTISTERY AT FLORENCE (AFTER DÜRM.).

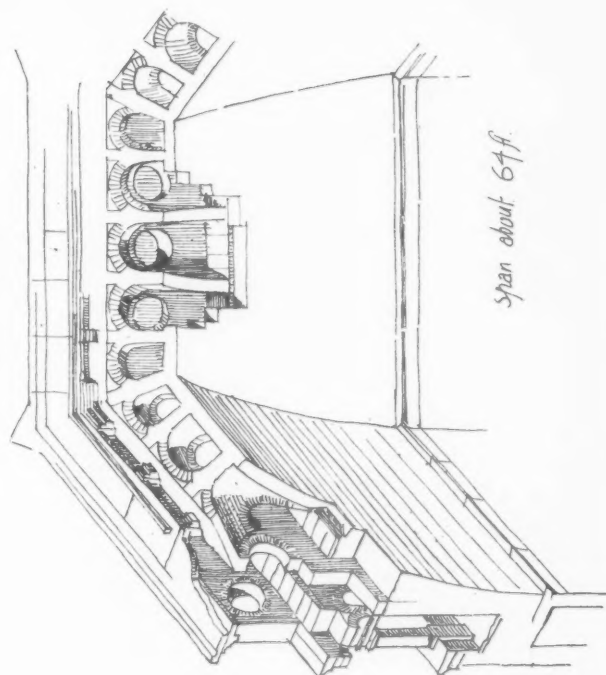


FIG. 9.—BAPTISTERY AT CREMONA (AFTER DÜRM.).

Span about 64 ft.

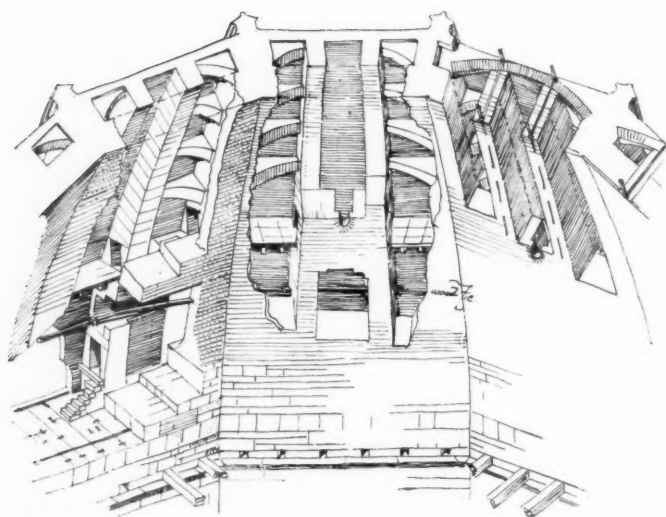
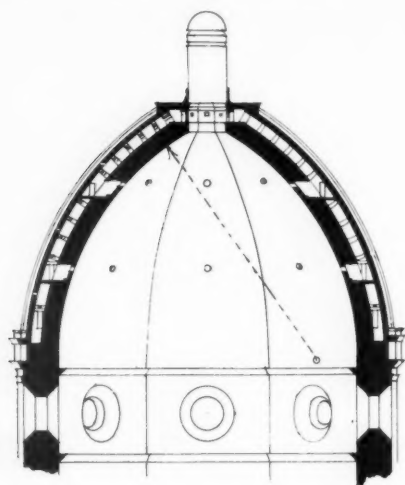


FIG. 11.—DUOMO AT FLORENCE (AFTER DURM).

forms the background for the principal decorations. Above these two is another timber-framed, dome-shaped roof which carries a lantern (see Fig. 16). In one of Wren's early drawings for St. Paul's, preserved in the Library at the Cathedral, there is a very similar design, but whether Mansard the architect of the Invalides received the idea from Wren or *vice versa* I do not know. In Wren's St. Paul's, however, the triple arrangement adopted is based on construction requirements and not wholly governed by the question of internal appearance; the middle dome or cone is not seen as part of the design, but is employed to carry the lantern and aid in supporting the outer timber dome.

The use of the cone to carry the lantern is usually stated to be an original idea of Wren's. Such a brick cone had already been built in the Baptistery at Pisa, however, which cone is not

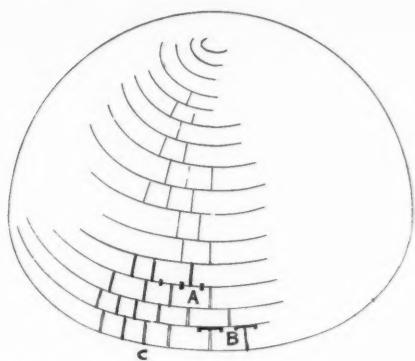


FIG. 12.

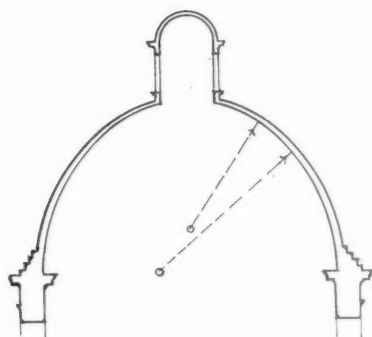


FIG. 13.

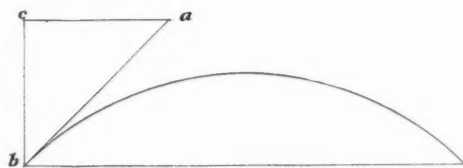


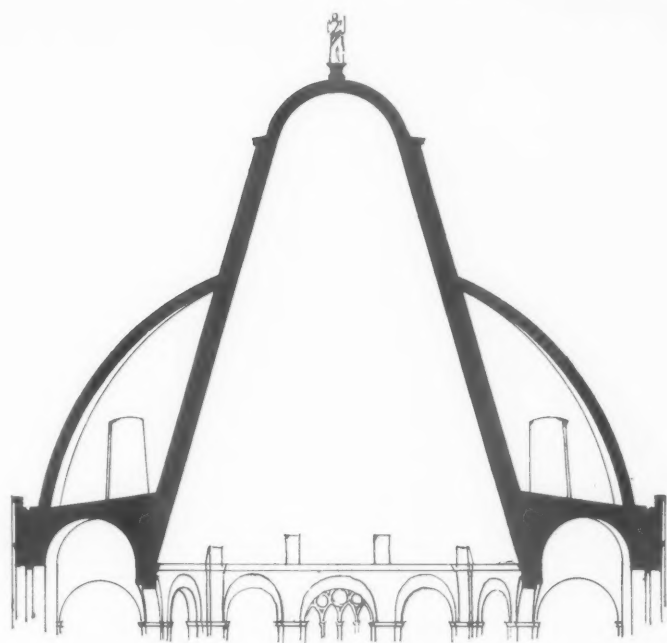
FIG. 14.

seen externally (save at the top), being hidden by the outer circular dome, also of brick covered externally with tiles bedded on the bricks, which outer dome forms the chief feature of the building. This outer dome is partly at least carried by radiating vertical walls which rest on the cone (see Fig. 15).

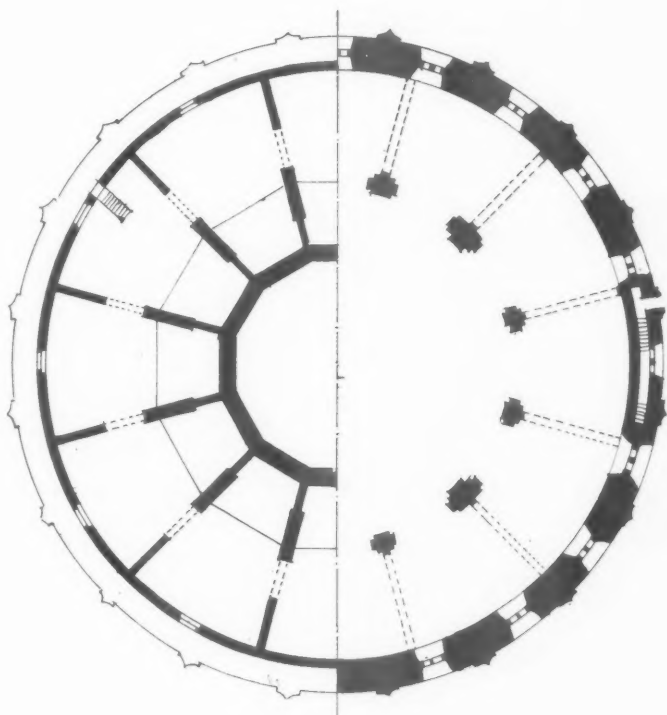
The cone is covered in at top by a hemispherical portion as in St. Paul's. Viewed from outside it seems a hemispherical dome carrying a small lantern; in reality, the lantern (if we may use that term for a part which gives no light) is the continuation of upper part of the cone.

In later times there is the dome of the Pantheon in Paris, about seventy years after Wren's work, and also of triple construction (Fig. 17).

There the exterior dome is of stone covered with lead, and the middle dome—which, as in St. Paul's, carries the lantern—is of a curved outline, less



Section



Plans.

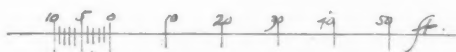


FIG. 15.—BAPTISTERY AT PISA.

fitted for the work than the straight cone of that church.

The single dome makes no conspicuous feature on the exterior unless of a very great height, which height is frequently too great for interior effect. The double dome enables us to secure a proportionate interior, and at the same time to make the chief internal feature the chief exterior feature also. The triple dome seems used not only for these purposes, but for either of two others: (a) to carry the lantern as in St. Paul's; (b) to afford a mysterious background, at a distance which the eye cannot well gauge, for the display of painted decorations as in the Dome des Invalides.

In some cases the lantern is carried by the exterior dome, in others by the middle dome, in others again partly by one and partly by the other. In the last case there is always a great uncertainty as to the proportions of the load carried by each, and as the stresses on these works are sufficiently indeterminate already, it seems better practice to let the whole duty devolve upon one or other.

Domes in Roman times were frequently constructed of concrete with brick ribs. Of these it has been frequently said that they exert no thrust upon the supports, a statement which I think is an error the original builders never made. Concrete is a material incapable of resisting any great tensile stress, and one very liable to crack from causes other than the strain produced by the loads. It may crack from shrinkage or expansion in setting or from temperature stresses, so that it would be a rash thing to rely upon concrete to resist tensions when its power to do so may be destroyed by such causes. Fig. 10 shows a section of the dome of the Temple of Minerva Medica—a concrete vault with brick ribs. I conceive he would be a very rash man who would assert that at any section, say just above the stepped base, a free horizontal joint might be put with ball bearings, without causing collapse; yet if the dome takes up the thrust by its own strength, that free joint might safely be made.

The builders of such domes as this, of the Pantheon, Santa Sophia, and

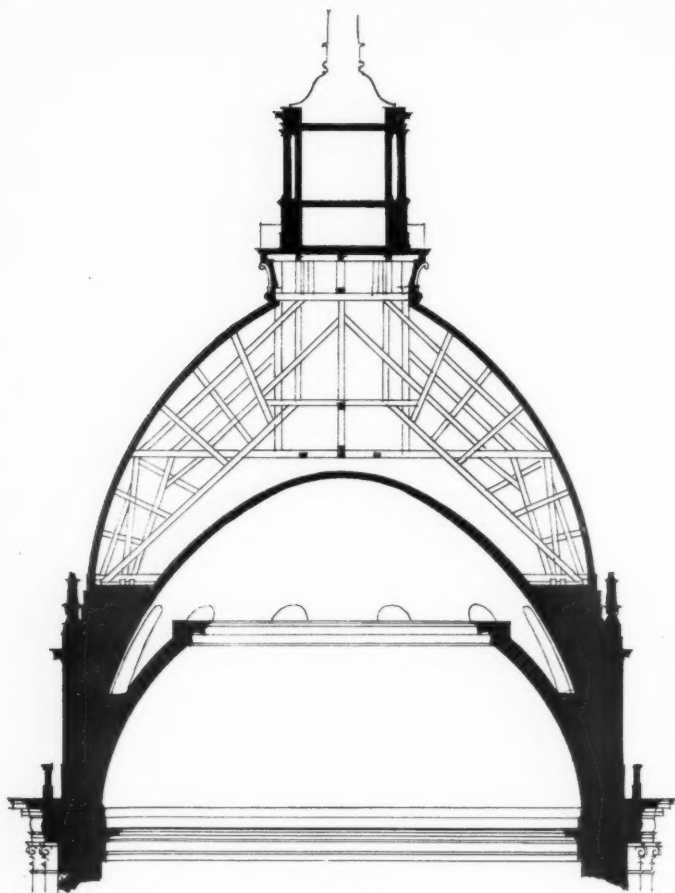
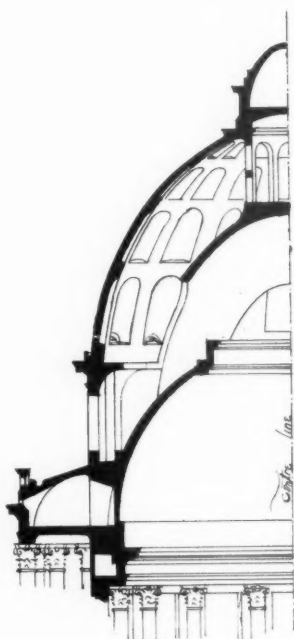


FIG. 16.—DOME DES INVALIDES, PARIS.

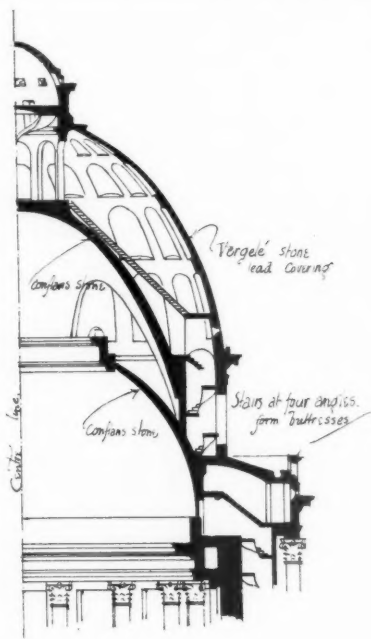
other Byzantine domes in Constantinople, appear to have had a good practical knowledge of the theory. For from the crown of the dome to the point where compression on the meridians disappears the dome is as thin as theory would make it. Below that point the thickness immediately increases. The effect of this is that the line of pressure is made more vertical and is probably kept within the section without the aid of horizontal ring stresses (hoop tensions). The same results might be got by making the upper part of the dome above the point of zero stress in a very light material such as tufa or earthenware pots, and the lower part in a heavy one such as granite concrete. But this is not to say that there is no outward thrust on the

abutment. On the contrary it warrants us in saying that the designers contemplated the lower part of the dome exerting considerable outward thrust, as it usually does. In all these domes there are sometimes thick walls, occasionally even with distinct and separate buttresses; sometimes there are abutments given by semidomes.

Concrete, by reason of its great resistance to compression, is an excellent material for domes, and may be used without reinforcement above the point of zero stress. Above that point all stresses are compressions. Below that point the stresses on the meridians are tensions; and as cracks which arise from shrinkage or temperature variation may seriously reduce the strength, these should be provided for, either by metal reinforcement capable of taking up the tension, or by so arranging the weights that the lower part requires no hoop tensions for equilibrium. At the base an abutment or tie is essential if, as all authorities recommend, the tensile strength of the concrete should be disregarded. Concrete domes, as usually built nowadays, are not the massive thickness of Roman times, but thin shells, and it is customary to distribute a metal reinforcement throughout the



Section through centre of arches.



Section through piers (diagonal section).

FIG. 17.—DOME OF THE PANTHEON, PARIS.

whole structure in order to resist the tensions set up by changes of temperature, &c.

There is in the minds of many architects an objection to metal reinforcements in either concrete or masonry, based partly on an æsthetic feeling that a masonry or concrete structure, if designed so as to satisfy the eye, should be of sufficient strength to be perfectly stable without concealed helps, and partly on a fear that the metal may rust and expand so as to be a source of danger. Buildings have been erected which fulfilled the first condition and yet failed by their

own weakness, so that the eye is not always a fair criterion; and we know now that iron or steel embedded in properly-made concrete does not rust, but is perfectly preserved. The great chain of the dome of St. Paul's, examined lately by Mr. Somers Clarke, Surveyor to the Cathedral, was found in excellent condition after being buried in concrete for two hundred years, and we have seen that the architects of days gone by did not fail to reinforce their domes when required, regardless of æsthetic objections.

WILLIAM DUNN.

(*To be continued.*)

The Norwich Union Life Insurance Society's Head Offices, Norwich.

G. J. and F. W. Skipper, Architects.



THIS building, which has been erected on the site of an old house built in the fifteenth century by the Earl of Surrey, has been carried out in selected stone from the Clipsham Quarries, except the two statues, which were executed

by Mr. Chavalliaud in Portland stone, in Farmer & Brindley's studio.

With regard to the interior, the requirements included a large general office, as well as many other smaller offices. The general office has been made the chief feature of interest, the other offices being placed around it. The necessity for providing ready access from this central domed hall to the other rooms suggested an open colonnade on the ground floor, and on the upper floor corridors are arranged giving access to the rooms occupied by the directors (board and committee-rooms, &c.) on two sides, and the two other sides are occupied by the solicitor's offices.

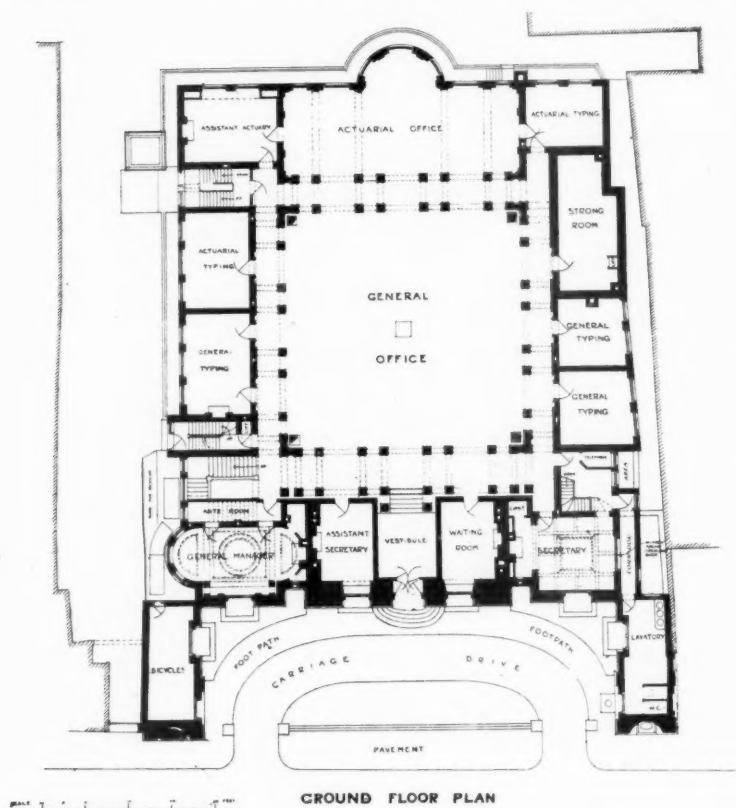
The whole of the interior of the central hall has been carried out in marble from floor to ceiling. The columns, which are all structural, are monoliths of cipollino and verde antico marble. The caps and bases are in white statuary. The entablature is of alabaster, and the lining of the walls is of Skyros marble of a deep red veining below the impost moulding, and above the impost moulding of the greyer description of veining. The spandrels above the arches are panelled out with white marble used for the surround, and cipollino and porphyry-coloured rosso antico fill in the oblong panels; the cornice is in alabaster. The whole of the ceiling has been

executed in plaster and painted. The floor for the chief part is polished marble, except where the clerks stand, and there the floors are laid in oak parquetry.

The whole of the marble work, including the carving, and the carving on the exterior stonework, has been executed by Farmer & Brindley.

The interior of the hall is lighted by electric lamps hidden in flat bronze basins and behind the cornice in the dome, so that the light is reflected to the ceiling, and the glare of the lamps is entirely avoided. The desk lamps for the clerks are screened by green silk shades, so that every precaution has been taken to ensure the successful lighting of the building and the protection of the eyesight of the workers. This work was entrusted to Drake & Gorham. Fresh warmed air enters this part of the building through a specially designed opening or fountain in the centre of the hall, and is dispersed by a canopy suspended immediately above it from the centre of the dome; surmounting this canopy is a suitable bronze figure, the work of H. C. Fehr, from J. W. Singer & Sons' foundry. Two bronze sculptured subjects have been placed in panels in the vestibule under the titles "Solace" and "Protection," with special reference to the objects of the society; these were executed by Mr. Stanley Young.

The staircase is entirely executed in marble, the walls being lined with cipollino opened up, the handrail being of pavonazzo marble, whilst the pedestals, columns, and pilasters are of a very choice Breccia marble. The staircase has a painted window, the work of A. J. Dix, and the vaulted ceiling over the staircase has been painted by George Murray.



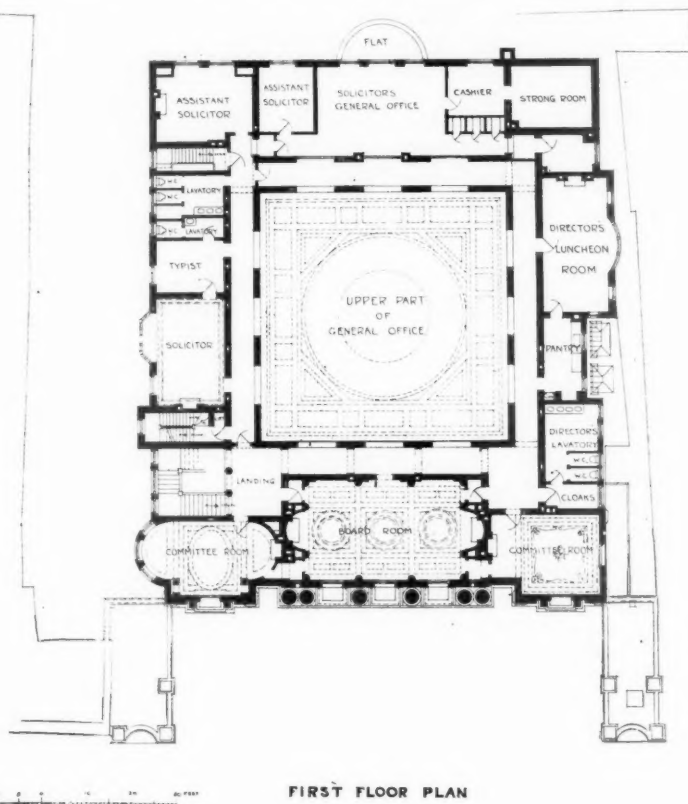
The walls of the board-room, a view of which is given, have been carried up to about two-thirds of the height in the finest Spanish mahogany, panelled, and with carved panels and enrichments, and the columns with their carved caps have also been carried out in mahogany, all being the work of H. H. Martyn & Co., Ltd. The main doorway has a pointed pediment, and on the pediment are two reclining figures carved in solid mahogany, which, together with all the rest of the carving, are left unpolished. These figures were unfortunately not in position when the view was taken, nor were the board-room table, carpet, nor sculptured figure subjects and ornaments on the upper part of chimney-pieces. The chairs are the old chairs belonging to the institution, dating from the time of Queen Anne. Above the mahogany work the walls have been painted, and in the semi-circular lunettes and in the coves at the end of the room figure subjects have been introduced. The ceiling has been entirely painted, and a

sparing amount of gilding applied. The main panels, of which there are three in the centre compartment of the ceiling, take emblematical figure subjects, and in the twelve panels that surround this there are also figure subjects. The whole of the painted figure subjects in this room have been painted by Mr. Murray. The electroliers have been carried out in brass, with some enamels, the work of the Artificers' Guild. The carving in the panels has been carried out by George Hawes of Norwich, who is also the general contractor. The carved figures over the doorway were executed by Farmer & Brindley. Sidney Pullen of London carried out the whole of the decorative painting in this room, and in the building generally. The chimney-pieces have been executed in pavonazzo statuary marble.

In the directors' luncheon-room the decorative painting of the frieze was the work of W. J.

Neatby of London.

The whole of the furniture and the specially



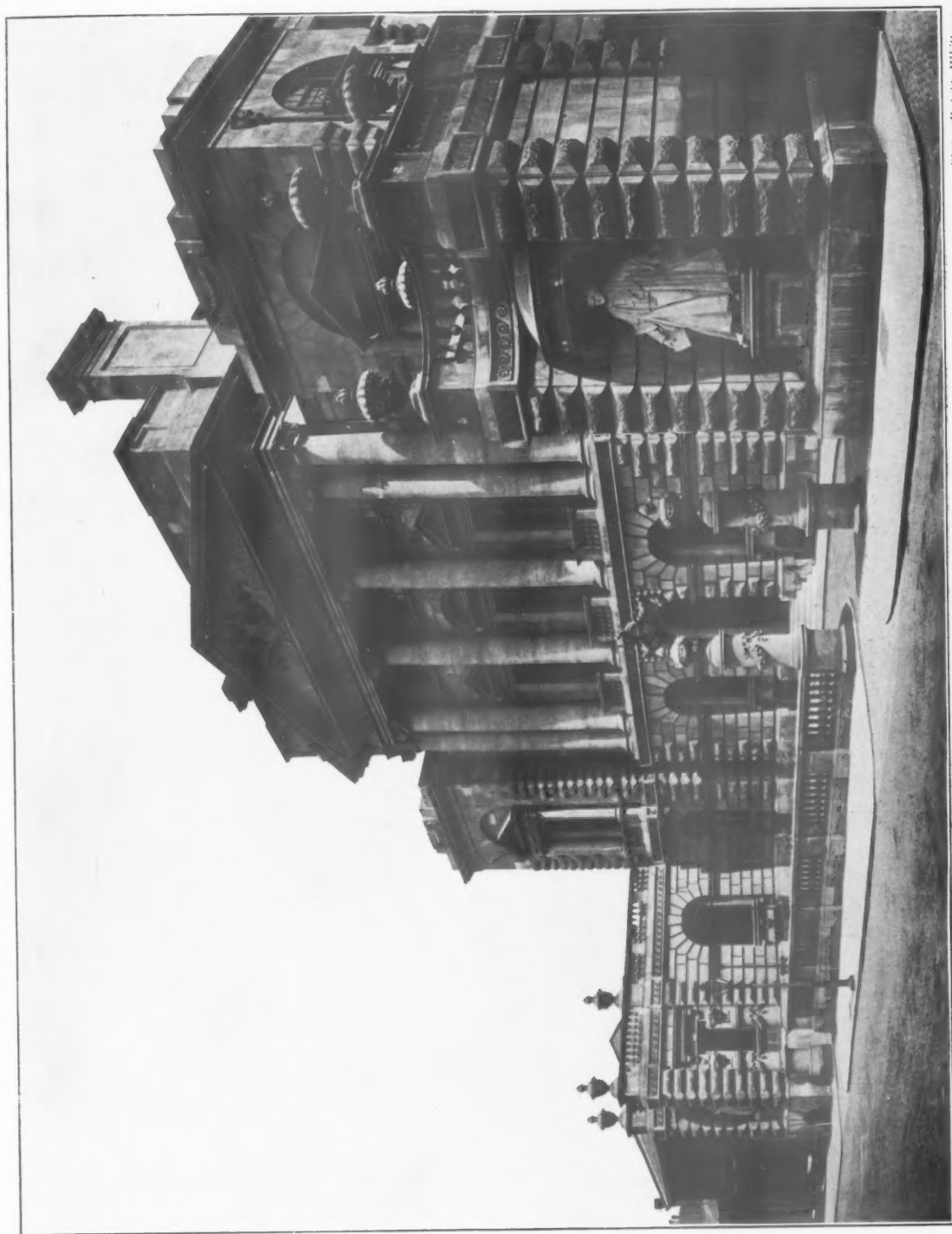


Photo: Knights Whitton.

GENERAL VIEW OF FAÇADE.

made carpets for the board-room, committee-rooms, luncheon-room, and the principal officials' rooms throughout the building, have been carried out to the designs of the architects.

The fireproof floors, roof structure, and asphalt flats were executed by Homan & Rodgers of London. For the floors, the Homan & Rodgers hollow brick construction was adopted—a type of floor now familiar to most architects, consisting of rolled steel girders interspaced with hollow firebricks in the shape of a triangular prism.

For this type of floor no wood centering is required while the concrete is being filled in, as the firebricks are in contact over the whole area, and consequently the concrete cannot find its way through the floor. A problem of considerable difficulty was presented in the construction of the dome. This is almost semi-spherical in shape. The skeleton consisted of a series of steels bars, radiating from a ring at the apex, and terminating in an octagonal frame at the base.

For the warming and ventilation of this building, carried out by James Keith & Blackman Co., Ltd., it was decided to adopt three systems:—

No. 1. For the main central hall.

No. 2. For the board-room, committee-rooms, and other important rooms in connection with same.

No. 3. For the separate offices and other rooms surrounding the central hall.

The central hall being of such an ornate character it was decided that no part of the plant for

warming and ventilating it should be visible. To overcome this difficulty, the Pressure or Plenum system was adopted, the plant for this work being fixed in the basement, the special heating medium being low-pressure hot water.

In the second system the rooms being also of elaborate design, and fitted with open fireplaces intended for use, it was decided, for the prevention of cold-air currents being drawn by the fires, to supply the rooms with sufficient warm or tempered air for combustion and ventilation. The apparatus for this is fixed in the basement, and is of a similar construction to that used for the central hall. But the arrangement for admitting the air into the rooms is in all cases concealed, though the air is changed six times an hour. In one of the committee-rooms the ornamental columns are used for the conveyance of the air, which is admitted through the ornamental band in the one case, and through the volutes in the other.

The other rooms are fitted with special ventilating radiators fixed at the windows; working in conjunction with them is an extraction system. The plant for this consists of a 72-in. electrically-driven Blackman fan fixed in a chamber outside the main building. From each room ducts are provided in the wall, ascending and connected to a main horizontal duct formed in the roof space, which are led to a main vertical duct descending and communicating with the chamber in which the extraction fan is fixed; the exits in the central hall are also connected to this system.

NORWICH UNION LIFE INSURANCE SOCIETY'S HEAD OFFICE, NORWICH.

GEORGE J. SKIPPER, F.R.I.B.A., and F. W. SKIPPER, Architects

J. HURN, Norwich, Contractor for the Foundations.

G. E. HAWES & SON, Norwich, General Contractors.

SOME OF THE SUB-CONTRACTORS.

HOMAN & RODGERS, London.—Iron Roof over Hall, Fireproof Floors, &c.

LONGDEN & CO., London; ARTIFICERS' GUILD, LTD., London.—Stoves, Grates, and Mantels.

ART PAVEMENTS & DECORATIONS, LTD., London.—Oak Wood Block Flooring.

FARMER & BRINDLEY, London.—Marble Work, Staircase, and Floors.

DRAKE & GORHAM, LTD., London.—Electric Wiring, Bells, and Telephones.

GEORGE CROTCH, Norwich.—Fibrous and Modelled Plaster.

G. E. HAWES & SON, Norwich; H. H. MARTYN & CO., LTD., Cheltenham.—Special Woodwork, Panelling, &c

A. J. DIX, London; W. J. NEATBY, London.—Stained Glass and Leaded Lights.

W. J. NEATBY, London.—Painted Frieze in Directors' Luncheon Room.

R. WAYGOOD & CO., LTD., London.—Electric Service Lifts.

THE ARTIFICERS' GUILD, LTD., London; J. W. SINGER & SONS, LTD., Frome.—Cut Metal Work and Electric Light Fixtures.

JAS. GIBBONS, Wolverhampton.—Door Furniture, &c.

JAMES KEITH & BLACKMAN, LTD., London.—Heating and Ventilating.

MILNER'S SAFE CO., London.—Safes, Strong-room Doors.

GRAY & CO.—Lightning Conductors.



Photo: Knights Whittome.

GENERAL VIEW OF GENERAL OFFICE.



Photo: Knights Whittome.

DETAIL OF CORRIDOR ROUND GENERAL OFFICE.



Photo : Knights Whittome.

DETAIL OF CORRIDOR AND ENTRANCE TO VESTIBULE.



Photo: Knights Whittome.

THE BOARD-ROOM

Church of St. Erkenwald, Southend-on-Sea.

Walter J. Tapper, Architect.



THIS church, as will be seen from the plan, is but partly built, only the choir and two bays of the nave having been erected at present. The design is of an extremely simple character, economy being the particular factor, and the walls are of local stock brickwork. It will be noted, however, that although the expenditure has been limited, the extreme loftiness of the building preserves the salient qualities of English church architecture. The interior is treated

quite as simply as the exterior, but the ceiling has some ornamental plaster-work, which has been modelled by Lawrence Turner of Lamb's Conduit Street, London. The electric light installation was carried out by Buchanan & Curwen of Westminster, and the electric light fittings were made by W. Bainbridge Reynolds of Clapham. The hangings at the sides and end of the sanctuary were made by Watts & Co. of Baker Street, W., and Haden & Sons of Trowbridge supplied the heating apparatus. The builders were T. & E. Davey, Ltd., of Southend, and W. Wise acted as clerk of works.

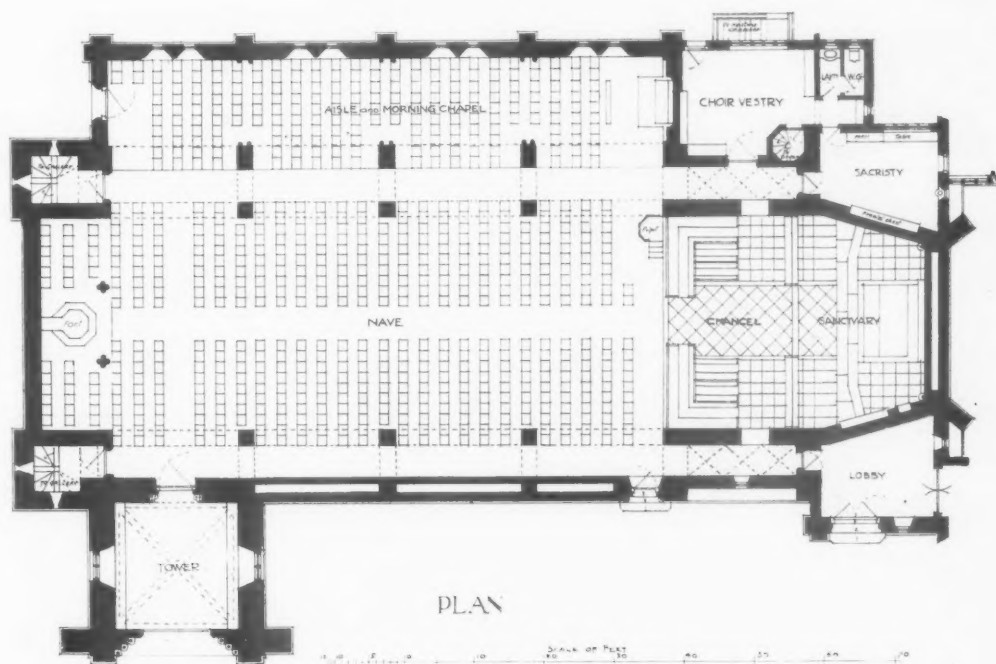




Photo: Arch. Review Photo Bureau.

GENERAL VIEW FROM THE SOUTH-EAST.



Photo: Arch. Review Photo Bureau.

GENERAL VIEW OF THE INTERIOR, LOOKING EAST.

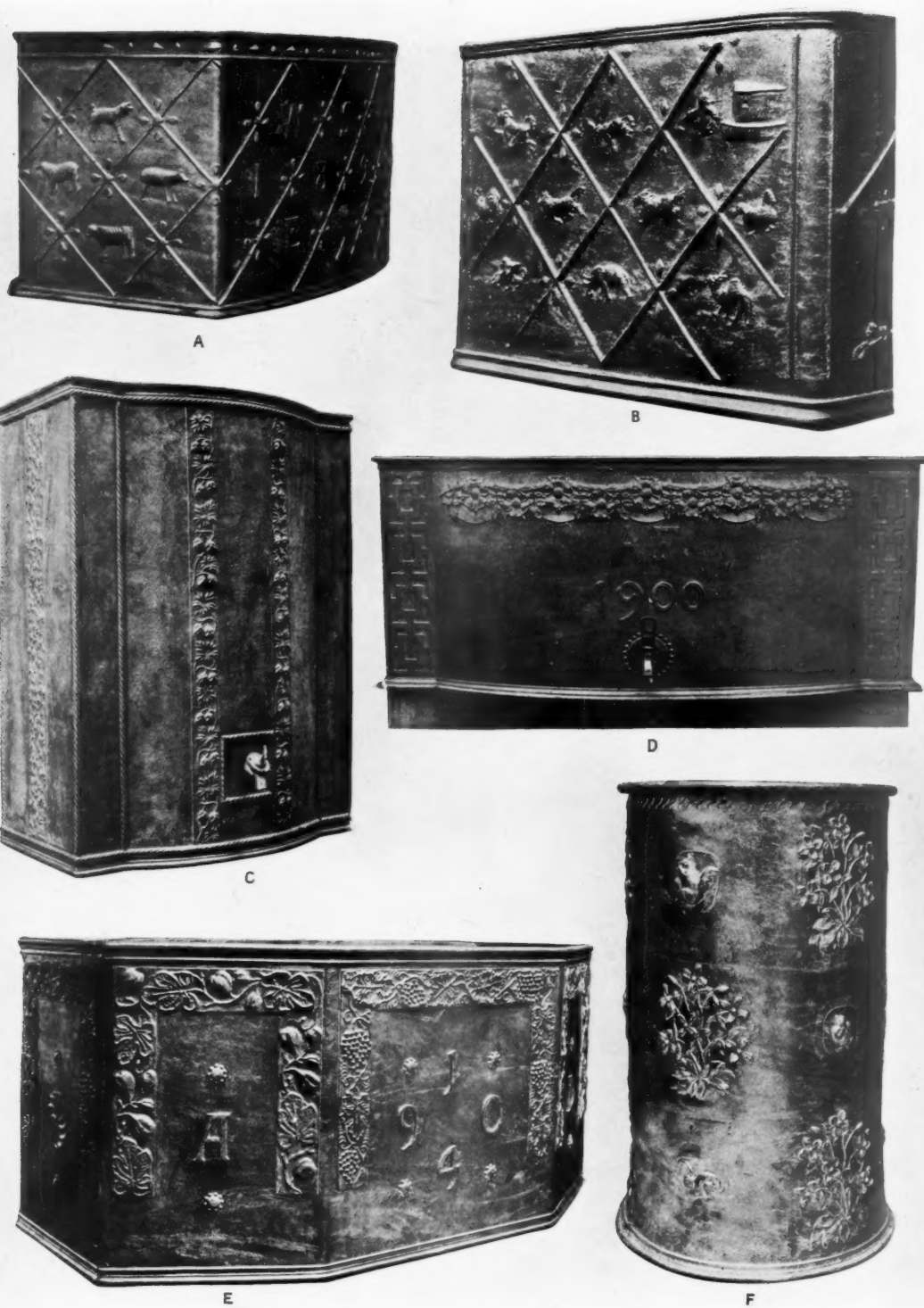


PLATE 32.—LEAD CISTERNS. A, B, AND D MADE BY MR. DODDS ; C, E, AND F BY MR. BANKART.

Modern Leadwork.

III.—CISTERNS, FONTS, VASES, &c.



NE of the most pleasant by-products of the renaissance of the formal garden is the revival in the use of lead cisterns.

Plate 32 shows six typical examples:—

A and B are based on the traditional lines of dividing the surface into small compartments and putting a little ornament in each.

I illustrate these two cisterns decorated with the same subject, Noah's Ark, as showing the widely differing treatments which can be employed with propriety in such work.

In A the models are of the simplest. The wooden creatures of the child's Noah's Ark were impressed in the sand and show the grain of the wood quite unaffectedly. In B, the animals, Noah, and his ark are freshly and vivaciously modelled, and the camel swings after the hasty elephant in most convincing fashion. The donkey is peculiarly delightful, and the creatures altogether are very engaging.

Decorative humour is ordinarily a dangerous trade, but here it is successful.

Both these cisterns were made by Mr. Dodds, as also D, a dignified design by Mr. Ernest Newton. In the old cisterns the varieties of shape were few. They were circular and segmental, rectangular or regularly polygonal. Plans like those of C and D add interest, however, and a moderate divergence from the more obvious plans is a safe departure from traditional methods. The frieze of cistern D is pleasantly formal, but has a slight sense of sharpness not quite satisfactory. Cistern C is to the same plan in the upright shape, and the decoration is very suitable.

The disposition of the bands of ornament on example E is unusual and attractive. The height of F is a notable feature. I do not remember any old cistern of anything like these proportions; that at Lincoln Cathedral is the nearest to it. The bunches of flowers and the little creatures—a newly-hatched chicken, a squirrel, &c.—are appropriate garden decoration. The informality of the thing is a feature that one likes, as a change, in a craft which usually relies for safety on a stiff conventionality. This tank was originally made by Mr. Bankart for his own garden, and C and F are also his work.

From the secular tub to the font is a considerable step in feeling, but little in craftsmanship. I do not know of any modern fonts which rival or

indeed endeavour to imitate the splendid figure-treatment of Norman times, when Apostles and Saints sat beneath elaborate arcading. The font of Fig. 33 is the fullest in treatment which has come to my notice, and it is full of unpretentious charm. The relief is soft and flat, and the symbolism interesting. The fish in the wide middle band are the common symbol of Christianity, and their natural swimming motion suggests the living waters of baptism. On the upper band appear four panels which represent the elements, a symbol which seems natural rather than spiritual, and the lowest band is made up of lilies, also a symbol of baptism.

The inscription round the top reads:—

NISI QUIS RENATUS FUERIT EX AQUA ET
SPIRITU SANCTO NON POTEST INTROIRE IN
REGNUM DEI.

One of the most interesting features of this font is its practical arrangement. Reference to the illustration will show that there is a small basin provided at one side. The main part of the font is filled with water which is blessed by the Archbishop once every year. The infant to be baptised is held over the small basin, from which the water used in the rite runs to earth. The font is an unusual but interesting shape on plan. The addition of the small oval basin indicated an octagon with two cardinal faces longer than the others. By making the cardinal faces rather convex and the diagonal faces a little concave, a vague cruciform suggestion is given, and the outlines take on the easy flowing feeling that is so appropriate to the nature of the material. The font is 3 ft. 6 in. high and stands on a stone plinth, which hollows as it meets the floor to allow room for the toes of the officiating priest, a very practical thought.

The font was made by Mr. Bankart for Mr. R. S. Lorimer, R.S.A., for a Roman Catholic Church in Edinburgh, and its whole treatment is original without being strained or precious.

The fonts of Fig. 34 and Fig. 35 are also by Mr. Bankart. The latter is at St. Alban's Church, Leicester, and was made for Mr. Howard Thompson, architect. An interesting feature is the decoration of the bottom of the bowl. It is a fresh and good idea to mitigate the usual bareness of the inside by ornament, and the crown of thorns and the crown celestial are added as emblematic of the difficulties and rewards of the Christian life entered by the gate of baptism. The vine is less appropriate, as being identified with the other of the two great sacraments, and, however pleasant



FIG. 33.



FIG. 34.



FIG. 35.—ST. ALBAN'S, LEICESTER. (THE LEFT-HAND ILLUSTRATION SHOWS THE BOTTOM OF THE FONT.)

a treatment decoratively, is a confusing emblem on a font.

In the example shown in Fig. 34 the lily is again used as on the Edinburgh font, and though the A.D. and the date are a somewhat aggressive size the design is more satisfying than that of Fig. 35. A most interesting feature of both these smaller bowls is in the saucer-shaped top, which is shown placed on the bowl in the case of Fig. 35, and separately in Fig. 34. With bowls of considerable water capacity, such as these, there is a practical difficulty in filling them, and one has sometimes seen this overcome in an odious way by the placing in the font of a small jug and basin, as though the font were a kind of spiritual lavatory. The saucer top is a practical way out of the difficulty, as it holds but little water. Dr. Yeatman-Biggs, Bishop of Worcester, was consulted as to the liturgical propriety of the saucer, and he agreed to its use, provided that it were made readily removable.

The formularies of the Church of England (so I am told, but know that I am on dangerous ground) provide for parents the right to demand that their children shall be baptised by immersion, and this use obtains in some parishes. Were the saucer top fixed to the bowl, this would be impossible, but by its being made loose the font is suitable for both uses.

Mr. Arthur Grove modelled the font shown in Fig. 37 to the design of Mr. H. Wilson, and it was cast by Mr. Dodds for St. Mark's Church, Brithdir, Wales. The decoration is of that soft and simple kind so entirely suitable to lead-



FIG. 36.



FIG. 37.—FONT, BRITHDIR.

work, and the broad horizontal margin round the top of the bowl emphasises a heavy material. It is a most admirable thing.

Of other leadwork of a watery sort, two examples are illustrated.

The pump of Fig. 36 was made by Mr. Dodds, and while it is sober and inoffensive it can hardly be said to be interesting. Cast-iron has, however, secured such an evil pre-eminence as a pump material that one welcomes any effort to bring lead into its own.

The fountain of Fig. 43 is a very charming work, and is intended to stand in the middle of a fine octagonal lead tank. Mr. Bankart made it, and was obviously greatly influenced in the design by the similar Dutch example in the South Kensington Museum. No doubt some such fountain originally stood in the great round lead tank of 1620 at St. Fagan's, Cardiff, which was illustrated in these pages in November, 1905.

Lead is pre-eminently the garden metal, and nothing can be better as a material for vases, for stone and terracotta are markedly perishable. The example of Fig. 38 was designed by Mr. Paxton H. Watson and modelled by Mr. Alfred Drury, A.R.A.; that of

Fig. 39 by Mr. John Belcher, A.R.A. Both were cast by Messrs. Singer and Son. The former owes something in idea to the pair of magnificent vases at Hampton Court Palace, where nude female figures form the handles, but the design of the vase itself is quite different. The treatment errs perhaps rather on the side of sharpness, but it is a successful composition.

The squatness of Mr. Belcher's vase is pecu-



FIG. 38.

liarily appropriate to the material, and seems to demand growing plants. I do not know whether it is used at Instow Park as a flower-pot, but can imagine no more suitable home for a fuchsia bush.

The example Fig. 41 is no flower-pot, but a frankly decorative vase with handles in elaborate repoussé, another work of Mr. Dodds. The flower-pot of Fig. 40 I illustrate not for any beauty or fitness of design, but rather as a technical *tour de force*. No part of it is cast. It is entirely beaten up, and, with the exception of the horns, out of a



FIG. 40.

single sheet of 10 lb. lead, 6 ft. 6 in. by 6 ft. 6 in. The vase is 3 ft. 9 in. wide by 2 ft. 2 in. high, and is in the possession of Sir Weetman Pearson at Paddockhurst. The ram's horns are of wrought lead and soldered to the bowl. I have seen eighteenth-century vases of similar design, but it is a rather dreary fancy. This vase has an inner lead lining, and the interspace is filled with mastic. The maker, Mr. A. B. Laidler, is a capable worker in cast lead as well as wrought, but it is refreshing to find technical skill in the working of sheet lead put to some other uses than mere sanitary plumbing. The repoussé method was but little used in the seventeenth century, the golden age of English leadwork, while contemporary Frenchmen were doing amazing foliage and flowers in this way for gable finials and the like.

It may be hoped that in modern work beaten lead has come to stay.



FIG. 39.



FIG. 41.



FIG. 42.



FIG. 44.



FIG. 43.

The blank clock-face of Fig. 42 by Mr. F. W. Troup is another example of an unusual but entirely suitable use of lead. Messrs. Hope & Sons have also recently made a plain clock-face with cable edging that is simple and successful. The art of modern leadwork owes a great debt to Mr. F. W. Troup for his classes at the Vincent Square Technical School have been a great opportunity (unhappily most inadequately appreciated) for the plumber to learn that his trade has great artistic possibilities. In his own designs for leadwork Mr. Troup always strikes the right note, and his sundial (Fig. 45) is a pleasant object simply decorated. That of Fig. 44, by Mr. James Cromar Watt, is more ambitious, but very successful. He has called in aid discs of jasper, dull red and greyish-green alternately, and the ornament is a good deal relieved by gilding. The whole effect is rich and interesting.

The illustrations of this article are enough to prove that modern leadwork is a serious and artistic craft, in which much has been achieved and more promised. If, more-



FIG. 45.

over, they and the seven articles on the old work which I have published in these pages have perhaps done something to draw attention to a metal too long misunderstood and neglected I shall be well rewarded.

LAWRENCE WEAVER, F.S.A.

Christ Church, North Brixton.

Beresford Pite, Architect.



HIS church was erected a few years since to replace an early Victorian chapel which had become a parish church. The principal difficulties to be surmounted were the limited space and the necessity for economy.

It was also desired that the whole congregation (estimated at 1,200) should be able to see and hear without interference by piers, and provision had to be made for a choir and organ. As will be seen from the plan, every seat in the church has a view of the pulpit entirely unhampered by piers or columns. The nave and transepts are of equal width and have a clear floor space, the crossing being domed over. The exterior facings are of grey stock bricks relieved with bands of purple Berkhamstead bricks and some Portland stone dressings. The joints of the brickwork have been raked out, and the pointing is kept back about half an inch from the face. The bands of purple bricks are varied in number on the different planes of the building, those parts

most recessed having more bands than the rest of the structure. In the interior the dome is carried on four brick arches 4 ft. 6 in. thick, perfectly plain and square in section. The square is reduced to an octagon by diagonal girders which are clearly shown, the pendentives being formed in plaster. The roof of the nave has pine trusses carrying trussed purlins, and the pitch is flat. A diaper pattern has been produced on the boarded roof by alternately staining and leaving unstained short lengths of the boarding. The church is not properly orientated, the chancel being at the west end, and the accommodation for the choir and organ as well as a number of sittings is found in the large gallery placed at the east end.

These views are published to show the building as it was originally completed by the architect, and they were taken to forestall an addition to the front which has just been carried out without reference to the architect. The builder was Mr. A. A. Webber, of Mortimer Street, S.W., and the cost was £13,000.

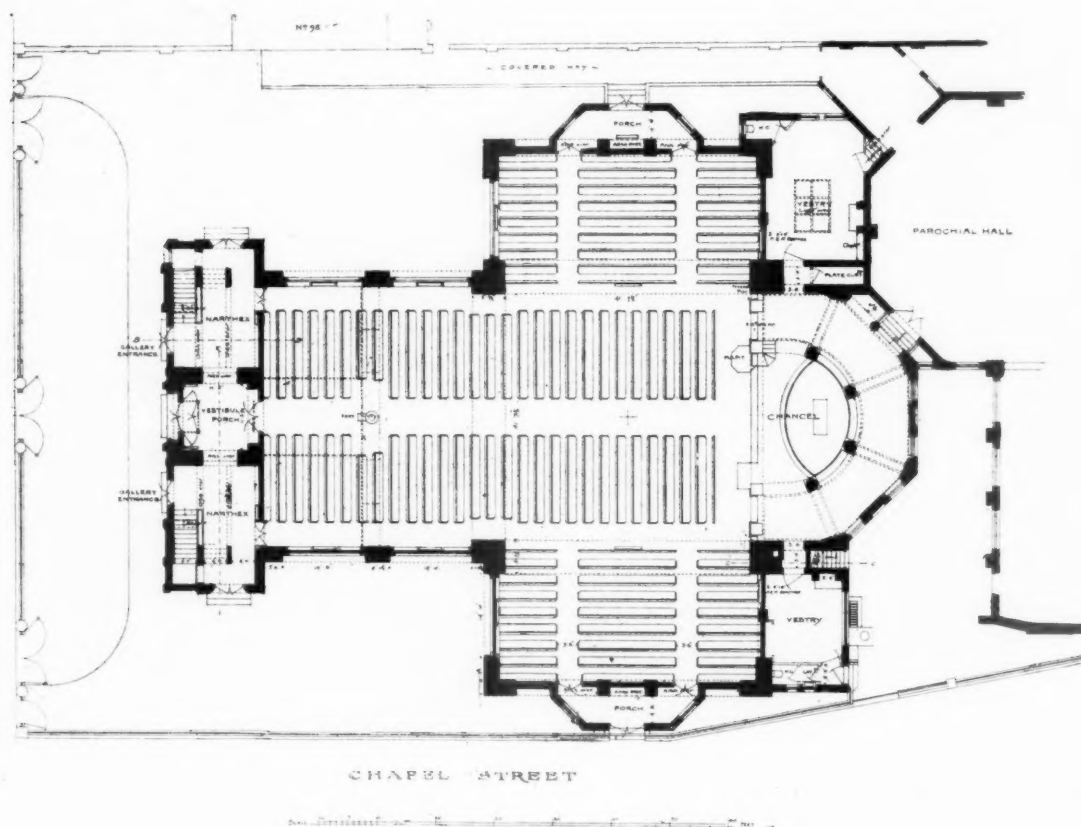




Photo : Bedford Lemere & Co

DETAIL OF THE PRINCIPAL FRONT.



Photo: Bedford Lemere & Co.

GENERAL VIEW OF THE PRINCIPAL FRONT.



Photo: Bedford Lemere & Co.

VIEW FROM CHAPEL STREET.

Additions to Cowley Church, Oxon.

The Late G. F. Bodley, R.A., D.C.L., Architect.



THE TOWER.

Photo: C. Ellis



Photo: C. Ellis.

THE ROOD SCREEN

*Photo: C. Ellis.*

THE CHOIR STALLS.



DOMES OF THE ROCK FROM THE MOSQUE OF EL AKSA, JERUSALEM
FROM THE WATER-COLOUR BY WALTER TYRWHITT.



CAIRO: SHARIA DARB EL GAMAMIZ.
FROM THE WATER-COLOUR BY WALTER TYRWHITT.

Illustrations from "Cairo, Jerusalem, and Damascus," by the courtesy of Messrs. Chatto & Windus.